



US Army Corps  
of Engineers  
Kansas City District

## Pomona Lake Kansas

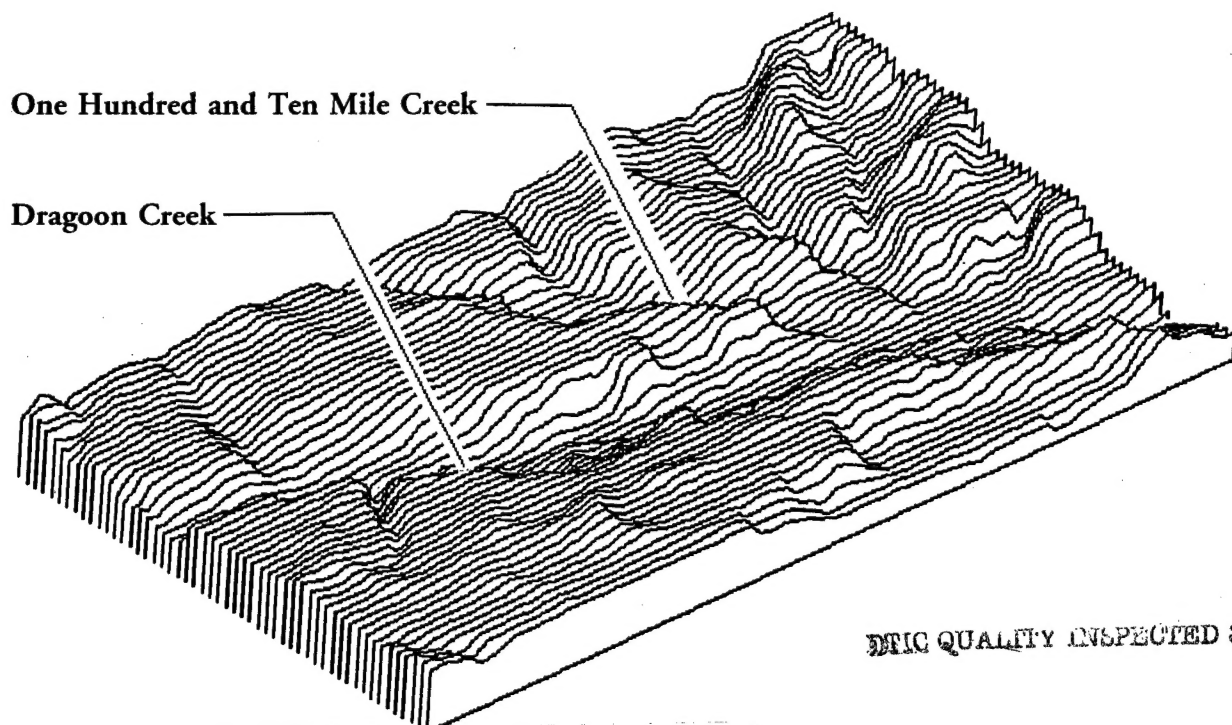
Archaeology Laboratory  
University of South Dakota

# A 1993 Cultural Resources Inventory at Pomona Lake in Osage County, Kansas

Contract DACW41-93-C-0041

**DISTRIBUTION STATEMENT A**

Approved for public release;  
Distribution Unlimited



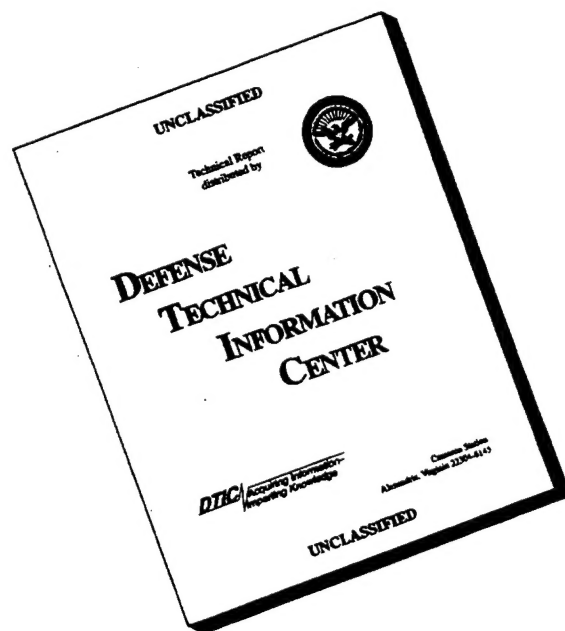
DTIC QUALITY INSPECTED 3

1995

19960723 012

L.E. Bradley, PhD  
Shonna Nepveu, BA

# DISCLAIMER NOTICE



**THIS DOCUMENT IS BEST  
QUALITY AVAILABLE. THE  
COPY FURNISHED TO DTIC  
CONTAINED A SIGNIFICANT  
NUMBER OF PAGES WHICH DO  
NOT REPRODUCE LEGIBLY.**

---

A CULTURAL RESOURCES INVENTORY AT POMONA LAKE IN  
OSAGE COUNTY, KANSAS

L. E. Bradley, PhD  
Principal Investigator

Archaeology Laboratory  
University of South Dakota

Prepared by  
L. E. Bradley, PhD  
Shonna Nepveu, BA

Archaeology Laboratory  
University of South Dakota  
414 E Clark Street  
Vermillion, SD 57069

June 15, 1995

Prepared for contract DACW41-93-C-0041  
Department of Army  
Kansas City District. Corps of Engineers  
700 Federal Building  
Kansas City, Missouri 64106-2896

## Executive Summary

The project area for the 1993 archeological survey of Pomona Lake included 4521 acres of unsurveyed lands between the 986.4 ft amsl contour and the Corps of Engineers boundary. High reservoir levels due to increased rainfall during 1993 resulted in the removal of vegetation from much of the project area and made survey conditions optimal.

A survey crew from the University of South Dakota Archaeology Laboratory recorded 14 previously unidentified archeological sites in the project area during 1993. Of these, 10 are identified as prehistoric. Samples of materials from nine of the ten prehistoric sites consist entirely of lithic specimens. Ceramics were recovered from only one of the prehistoric sites.

Only three components at the ten prehistoric sites produced diagnostic materials to allow general identification of cultural affiliation. One of these, 14OS145, is assigned a Pomona cultural affiliation. A large notched projectile point from the same site suggests a Plains Woodland component there. A large fragment of a stemmed projectile point collected at 14OS151 identifies that site as Plains Archaic. Collections from eight of the other prehistoric sites recorded in 1993 consist of flakes or other materials too ubiquitous to allow assignment of cultural affiliations.

Three of the four historic sites recorded in 1993 are structural remains of Euroamerican origin. The other is an arrangement of stone slabs and a mound of debris. The grouping of slabs is similar to Sac and Fox burials excavated in the project area in the 1950s. Since the site contains probable human remains, it must be evaluated in terms of NAGPRA, "Native American Grave and Repatriation Act of 1990" (P.L. 101-601). Because NAGPRA requires a justification for removal of human remains, it may be possible to determine NRHP status of the site by exposing only enough material to allow determination of site content.

Recommendations for sites recorded in 1993 fall into three categories: no further investigations, removal from agricultural use or NRHP testing. The multicomponent prehistoric site and one of the Euroamerican homesteads are recommended for NRHP testing. Locations of four prehistoric sites are recommended for removal from agricultural use. Eight of the other sites lack content or integrity for inclusion in the NRHP. Avoidance is recommended for the burial site.



UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED			1b. RESTRICTIVE MARKINGS		
2a. SECURITY CLASSIFICATION AUTHORITY			3. DISTRIBUTION / AVAILABILITY OF REPORT APPROVED FOR PUBLIC RELEASE UNLIMITED DISTRIBUTION		
2b. DECLASSIFICATION / DOWNGRADING SCHEDULE					
4. PERFORMING ORGANIZATION REPORT NUMBER(S)			5. MONITORING ORGANIZATION REPORT NUMBER(S)		
6a. NAME OF PERFORMING ORGANIZATION UNIVERSITY OF SOUTH DAKOTA ARCHAEOLOGY LABORATORY		6b. OFFICE SYMBOL (If applicable)	7a. NAME OF MONITORING ORGANIZATION		
6c. ADDRESS (City, State, and ZIP Code)			7b. ADDRESS (City, State, and ZIP Code)		
8a. NAME OF FUNDING / SPONSORING ORGANIZATION KC DISTRICT CORPS OF ENGINEERS		8b. OFFICE SYMBOL (If applicable) PD-R	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER DACW-41-C-0041		
8c. ADDRESS (City, State, and ZIP Code) 700 FEDERAL BUILDING, 601 E. 12th STREET KANSAS CITY, MISSOURI 64106-2896			10. SOURCE OF FUNDING NUMBERS		
			PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.
			WORK UNIT ACCESSION NO.		
11. TITLE (Include Security Classification) A 1993 CULTURAL RESOURCES INVENTORY AT POMONA LAKE, OSAGE COUNTY, KANSAS					
12. PERSONAL AUTHOR(S) L. E. BRADLEY AND SHONNA NEPVEU					
13a. TYPE OF REPORT FINAL		13b. TIME COVERED FROM 1993 TO 1995	14. DATE OF REPORT (Year, Month, Day) June 25, 1995		15. PAGE COUNT 118
16. SUPPLEMENTARY NOTATION					
17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)		
FIELD	GROUP	SUB-GROUP	POMONA LAKE OSAGE COUNTY ARCHEOLOGICAL SURVEY		
19. ABSTRACT (Continue on reverse if necessary and identify by block number)  The USD Archaeological Laboratory conducted a cultural resources inventory of approximately 4,521 acres at Pomona Lake between the 986.4 contour interval and Corps of Engineers boundaries. The survey located 14 new sites. Ten are prehistoric, 3 are historic Euroamerican and one is Sac and Fox. Two sites are recommended for NRHP testing, four are recommended for removal from agricultural and avoidance is recommended for the Sac and Fox site which may contain human remains.					
20. DISTRIBUTION / AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> UNCLASSIFIED/UNLIMITED <input type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS			21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED		
22a. NAME OF RESPONSIBLE INDIVIDUAL			22b. TELEPHONE (Include Area Code) 816-426-3672		22c. OFFICE SYMBOL CEMRK-PD-R

DD Form 1473, JUN 86

Previous editions are obsolete.

SECURITY CLASSIFICATION OF THIS PAGE  
UNCLASSIFIED

**Statement:**

The study performed herein by the Contractor for the Corps of Engineers is authorized in the National Historic Preservation Act of 1966, as amended. Accomplishment of this work provides documentation evidencing compliance with Executive Order 11593 "Protection and Enhancement of the Cultural Environment" dated 13 May 1971, and Section 110 of the National Historic Preservation Act.

Funds for this investigation and report were provided by the U.S. Army Corps of Engineers. The Corps may not necessarily agree with the contents of this report in its entirety. The report reflects the professional views of the Contractor who is responsible for collection of the data, analysis, conclusions and recommendations.

## TABLE OF CONTENTS

EXECUTIVE SUMMARY .....	i
REPORT DOCUMENTATION PAGE .....	ii
STATEMENT .....	iii
TABLE OF CONTENTS .....	iv
LIST OF FIGURES .....	vi
LIST OF TABLES .....	viii
 Chapter 1: INTRODUCTION .....	 1
Background .....	1
Purpose of the Study .....	1
Previous Investigations .....	2
Report Organization .....	3
 Chapter 2: RESEARCH GOALS .....	 7
Research Design .....	7
Field Survey Methods .....	7
Laboratory Methods .....	8
Chipped Stone Tool Classification .....	9
Lithic Manufacturing Debris .....	10
Ceramics .....	11
Pomona Variant Ceramics .....	11
Processing of Materials and Curation .....	12
Site Evaluations .....	12
 Chapter 3: ENVIRONMENTAL CONTEXT .....	 14
Physiography and Topography .....	14
Land Use .....	14
Geomorphology .....	14
Soils .....	16
 Chapter 4: REGIONAL CULTURAL HISTORY .....	 17
Paleo-Indian .....	17
Archaic Period .....	17
Plains Woodland .....	19
Plains Village .....	20
Protohistoric .....	21
Historic .....	21
 Chapter 5: SITE DESCRIPTIONS .....	 24
The 1993 Survey .....	24

Testing of Sites .....	25
14OS143 .....	28
14OS144 .....	31
14OS145 .....	34
14OS146 .....	44
14OS147 .....	47
14OS148 .....	50
14OS149 .....	53
14OS150 .....	57
14OS151 .....	60
14OS152 .....	63
Euroamerican Farmsteads .....	66
14OS153 .....	67
14OS154 .....	70
Research Questions for NRHP Testing at 14OS154: .....	71
14OS155 .....	73
14OS156 .....	76
PREVIOUSLY RECORDED SITES REVISITED IN 1993 .....	79
14OS102 .....	80
14OS103 .....	81
14OS342 .....	82
Chapter 6: CONCLUSIONS .....	83
SUMMARY OF RECOMMENDATIONS .....	83
Evaluation of Research Questions for the 1993 Survey .....	84
Settlement Patterns .....	85
GIS and Site Locations. ....	88
LIST OF TERMS .....	98
REFERENCES CITED .....	104

## LIST OF FIGURES

Figure 1. Map showing the 1993 project area. ....	4
Figure 2. Sites recorded in 1993 .....	26
Figure 3. Map showing location of site 14OS143 .....	30
Figure 4. Map showing location of site 14OS144 .....	33
Figure 5. Map showing location of site 14OS145 .....	40
Figure 6. Ceramics from 14OS145 .....	41
Figure 7. Chipped Stone Artifacts from 14OS145 .....	42
Figure 8. Chipped Stone Artifacts from 14OS145 .....	43
Figure 9. Map showing location of site 14OS146 .....	46
Figure 10. Map showing location of site 14OS147 .....	49
Figure 11. Map showing location of site 14OS148 .....	52
Figure 12. Map showing location of site 14OS149 .....	55
Figure 13. Chipped Stone Artifacts from 14OS145,14OS146,14OS148 and 14OS151. ....	56
Figure 14. Map showing location of site 14OS150 .....	59
Figure 15. Map showing location of site 14OS151 .....	62
Figure 16. Map showing location of site 14OS152 .....	65
Figure 17. Map showing location of site 14OS153 .....	69
Figure 18. Map showing location of site 14OS154 .....	72
Figure 19. Map showing location of site 14OS155 .....	75
Figure 20. Map showing location of site 14OS156 .....	78
Figure 21. Topographic Map of Pomona Lake from a DEM .....	94

Figure 22. Terrain model of Pomona Lake .....	95
Figure 23. Slope gradient at Pomona Lake .....	96
Figure 24. Slope aspect at Pomona Lake .....	97

## LIST OF TABLES

Table 1. Identified Sites at Pomona Lake Prior to the 1993 Survey . . . . .	5
Table 2. Culture-Historical Complexes of Osage County . . . . .	23
Table 3. Summary of Sites Located During the 1993 Survey of Pomona Lake . . . . .	27
Table 4. Sited Identified at Pomona Lake in 1993 . . . . .	87
Table 5. Cultural Components for the 40 Recorded Sites at Pomona Lake . . . . .	90
Table 6. Distribution of Archeological Components at Pomona Lake by Terrain Type	91
Table 7. Setting, Site Function and Recommendations for 1993 sites . . . . .	92
Table 8. Area Surveyed, Numbers of Sites and Predicted Number of Sites . . . . .	93

## **Chapter 1: INTRODUCTION**

### **Background:**

Pomona Lake lies in the Osage Cuestas physiographic subprovince of east central Kansas. The lake inundates the valleys of One Hundred and Ten Mile Creek and its tributaries above their confluence with the Marais des Cygnes River eight miles downstream. One Hundred and Ten Mile Creek flows from the reservoir outlet channel eastward where it joins the Marais des Cygnes River. The Marais des Cygnes continues its journey eastward, becoming the Osage River at the Missouri border and eventually forming Harry S. Truman Reservoir in Western Missouri (U.S. Army Corps of Engineers 1993). The multipurpose pool level at Pomona Lake is at an elevation of 974 ft amsl providing a surface area of 4000 acres and a shoreline 52 miles in length. Pomona Lake area includes approximately 6501 acres of fee lands between the level of the multipurpose pool and the government boundaries. Reservoir construction began in 1959 and reached completion by 1963. The Army Corps of Engineers is responsible for managing most of the facilities at Pomona Lake, while the Kansas Wildlife and Parks Department oversees Pomona State Park (U.S. Army Corps of Engineers 1993).

The project area (Figure 1) for the 1993 survey followed the contour of the margins of the lake and consequently had two well-delimited boundaries. Outer (Corps of Engineers) boundary limits were marked at intervals by small markers or signs; inner boundary limits were defined as the 986.4 ft amsl contour. The latter was easily calculated by noting the elevation of the lake level at the management office daily and extrapolating from that measurement. Both boundaries are irregular, with the distance between the two varying from a few meters to nearly one half kilometer.

### **Purpose of the Study:**

In response to Federal regulations, the Kansas City District Corps of Engineers developed an Historic Properties Management Plan for Pomona Lake in 1992 (Ziegler 1992). The plan (HPMP) provides for historic preservation activities and for the management of historic properties. The 1993 survey is one such preservation activity given high priority in the HPMP. The goal of the 1993 research was to provide a literature search and field survey of all unsurveyed lands at Pomona Lake and to evaluate the National Register of Historical Places (NRHP) status of each new site recorded. The survey was limited to the area between the 986.4 ft amsl contour and the Corps of Engineers boundary, an area of approximately 4521 acres.



### **Previous Investigations:**

Archeologists have conducted three systematic field surveys at Pomona Lake since the late 1950s. Roscoe Wilmeth conducted the first archeological survey of Pomona Lake for the Kansas State Historical Society in 1958 before reservoir construction. Schmits surveyed the area in 1982 and 1984.

Wilmeth's initial survey concentrated on terraces and floodplains of One Hundred and Ten Mile Creek, Coon Creek, and Dragoon Creek and focussed on surface collection and interviews with local land owners. Although Wilmeth recorded eleven sites in the area, only ten fell within the bounds of the reservoir. Sites 14OS301-14OS311 were located mainly along the terraces and floodplain areas of One Hundred and Ten Mile Creek, Coon Creek and Dragoon Creek. The Masenthin site (14OS301) contained Protohistoric burials thought to represent Sac and Fox occupations of the area. Data from the Hart site (14OS305), along with information recovered from other sites, led to the definition of the Pomona focus by Witty (1967, Wilmeth 1970, Schmits 1988). Wilmeth conducted further excavations at 14OS301 and 14OS305 (Wilmeth 1970). Reservoir construction destroyed or inundated 10 of the 11 sites reported in 1958 by Wilmeth (1970). The Kansas State Historical Preservation Officer (SHPO) regarded none of the 11 sites as eligible for inclusion in the National Register of Historic Places (NRHP) (Ziegler 1992:9).

In 1978, Traub developed a preliminary cultural resources management plan for Pomona Lake and resurveyed four sites; 14OS321, 14OS342, 14OS350 and 14OS367. Traub also reported four historic rock wall locations (1978:6-7).

Environmental Systems Analysis, Incorporated (ESA), recorded 11 new sites (14OS101-14OS111) in the Pomona Lake area in 1982 and 1984 (Schmits 1988). ESA's investigations included survey and evaluation of cultural resources located in the shoreline survey zone between the elevation of 974 and 986.4 ft amsl (Schmits 1988). ESA considered three of the eleven sites eligible for the National Register (14OS104, 14OS108 and 14OS109). ESA classified the remaining eight sites as ineligible for the NRHP because of their limited research potential. Each of the eight either lacked diagnostic material for establishing cultural affiliation or had been disturbed. For a list of the sites recorded before the 1993 survey refer to Table 1.

The 1993 survey by the University of South Dakota Archaeology Laboratory produced 14 previously unrecorded archeological sites in the project area. Of these, ten are identified as prehistoric. The remaining four are the remains of structures from the historical period. Three of the latter are of Euroamerican origin, and one may represent the brief Sac and Fox occupation of the area. Size of the surface collections made during the survey reflect the density of material present. Larger collections represent a sample of the materials present at dense surface scatters; less extensive collections represent small scatters. As specified in the Scope of Work for this project, surveyors could make only limited collections from newly discovered sites. Since intense collecting from ephemeral or limited

collections from newly discovered sites. Since intense collecting from ephemeral or limited use sites would damage or destroy them, surveyors collected only limited samples from them. The samples collected from nine of the ten prehistoric sites recorded during 1993 consist entirely of lithic materials. Surveyors found ceramics at only one site.

**Report Organization:**

Organization of this report follows that specified in Part I of the Scope of Work provided to the contractor by the Corps of Engineers, Kansas City District. The sections of this report discussing regional culture historical background, site descriptions and site evaluations follow the presentation of research goals and the environmental context of the study that immediately follows this section of the report.

# POMONA LAKE

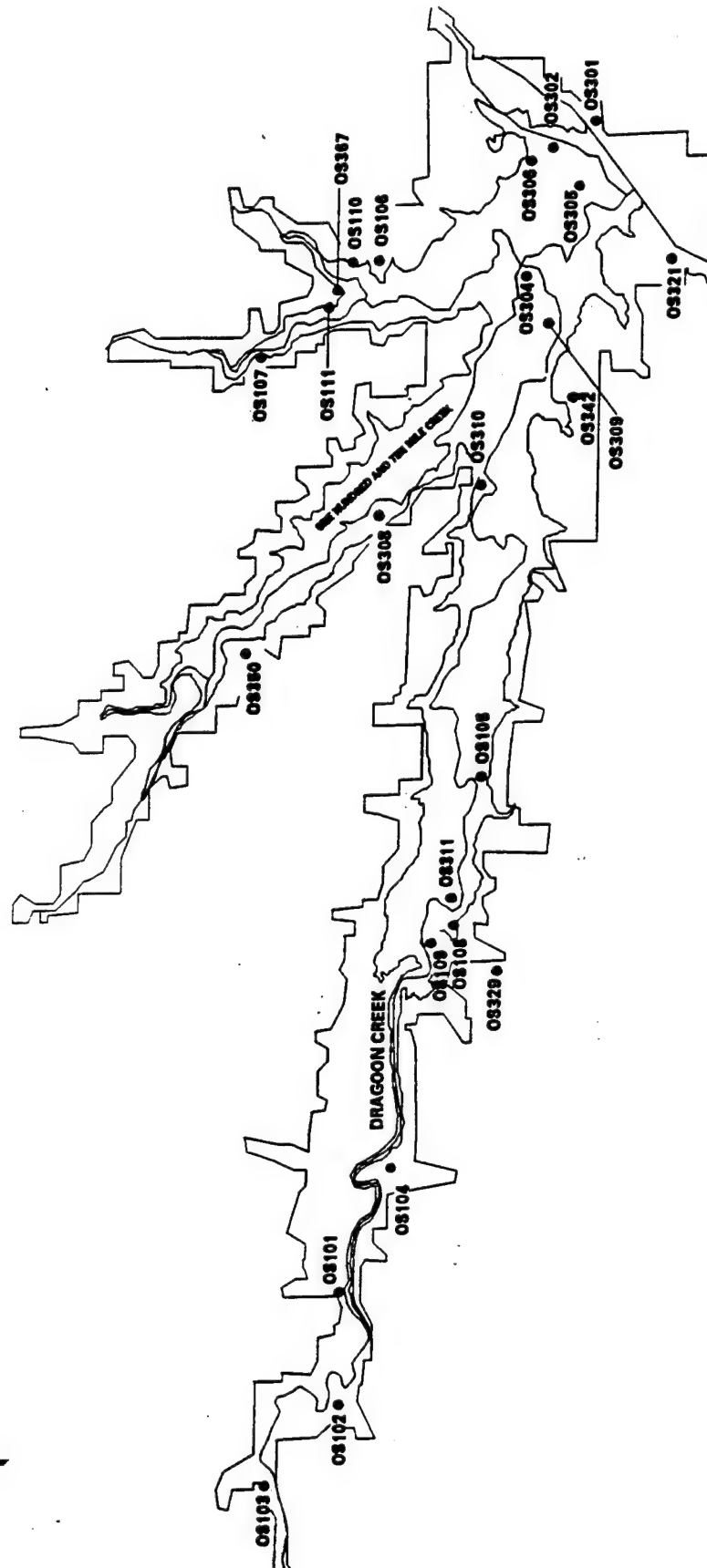


Figure 1. Map showing the 1993 project area.

Table 1. Sites Identified at Pomona Lake Prior to 1993.

Site Number	Cultural Affiliation	Level of Investigation	Reference	Potential/ Existing Impacts	Year Evaluated for NRHP	NRHP Recommendation
14OS101	Unknown	Survey	Schmits 1988	Agriculture	Schmits 1982	Not Eligible
14OS102	Archaic; Plains Village (Pomona Focus)	Survey	Schmits 1988	Agriculture	Not Evaluated	--
14OS103	Plains Woodland or Plains Village	Survey	Schmits 1988	Agriculture	Not Evaluated	--
14OS104	Plains Woodland (Greenwood Phase)	Testing	Schmits 1988	Flooding	Schmits 1984	Eligible
14OS105	Plains Village (Pomona Focus)	Testing	Schmits 1988	Erosion; Vandalism	Schmits 1984	Not Eligible
14OS106	Historic Euroamerican; Plains Village (Pomona Focus)	Testing	Schmits 1988	Erosion; Vandalism	Schmits 1984	Not Eligible
14OS107	Unknown	Survey	Schmits 1988	None	Schmits 1982	Not Eligible
14OS108	Plains Woodland or Plains Village	Testing	Schmits 1988	Erosion	Schmits 1984	Eligible
14OS109	Plains Village (Pomona Focus)	Testing	Schmits 1988	Erosion	Schmits 1984	Eligible
14OS110	Historic Euroamerican	Survey	Schmits 1988	None	Schmits 1982	Not Eligible
14OS111	Unknown	Testing	Schmits 1988	Erosion	Schmits 1984	Not Eligible
14OS301 (Masenthin Site)	Historic Sac/Fox	Survey; Excavation	Wilmeth 1958; Wilmeth 1970	Destroyed	Miller 1974	Not Eligible
14OS302	Historic Sac/Fox	Survey	Wilmeth 1958	Inundated	Miller 1974	Not Eligible

Table 1. Sites Identified at Pomona Lake Prior to 1993.

Site Number	Cultural Affiliation	Level of Investigation	Reference	Potential/ Existing Impacts	Year Evaluated for NRHP	NRHP Recommendation
14OS303	Plains Village	Survey	Wilmeth 1958	Inundated	Miller 1974	Not Eligible
14OS304	Unknown	Survey	Wilmeth 1958	Inundated	Miller 1974	Not Eligible
14OS305 (Hart Site)	Plains Village (Pomona Focus); Historic Euroamerican	Survey; Excavation	Wilmeth 1958; Wilmeth 1970	Inundated	Miller 1974	Not Eligible
14OS306	Historic Sac/Fox	Survey	Wilmeth 1958	Inundated	Miller 1974	Not Eligible
14OS308	Plains Woodland	Survey	Wilmeth 1958	Inundated	Miller 1974	Not Eligible
14OS309	Plains Archaic	Survey	Wilmeth 1958	Inundated	Miller 1974	Not Eligible
14OS310	Unknown	Survey	Wilmeth 1958	Inundated	Miller 1974	Not Eligible
14OS311	Plains Woodland; Plains Village	Survey	Wilmeth 1958	Inundated	Miller 1974	Not Eligible
14OS321	Historic Sac/Fox	Survey	KSHS Files; Traub 1978	Destroyed	Traub 1978	Not Eligible
14OS342	Plains Woodland	Survey	KSHS Files; Traub 1978	Public Use	Miller 1974	Not Eligible
14OS350	Plains Woodland; Plains Village (Pomona Focus)	Survey; Testing	KSHS Files; Traub 1978; Schmits 1988	Erosion	Schmits 1984	Not Eligible
14OS367	Plains Village (Pomona Focus)	Survey; Testing	KSHS Files; Traub 1978; Schmits 1988	Erosion	Schmits 1984	Not Eligible
Rock Walls	Historic Euroamerican (ca. 1860s-1870s)	Survey	Traub 1978	Vandalism	Not Evaluated	--

## **Chapter 2: RESEARCH GOALS**

### **Research Design:**

In the late summer and fall of 1993, the U.S. Army Corps of Engineers-Kansas City District conducted a cultural resources inventory and evaluation at Pomona Lake, Osage County, Kansas. Archeologists from the University of South Dakota Archaeology Laboratory surveyed approximately 4,521 acres of reservoir lands above the elevation of the shoreline. This inventory and evaluation accomplished basic cultural resources management goals including the identification of cultural properties by archeological survey and testing, data collection and analysis of properties found, site documentation, and recommendations for future National Register of Historical Places (NRHP) testing. Project goals also include the production of survey findings in a form suitable for use in public education. The research framework guiding the 1993 fieldwork addresses pertinent state of Kansas and regional research problems as set forth by the Kansas Prehistoric Archaeological Preservation Plan and the Kansas Preservation Plan Section on Historical Archaeology (hereafter referred to as KPP). This study derived the research goals (as outlined in the approved research design for the project) in part from previous archeological studies, the Pomona Lake Historical Properties Management Plan (HPMP), geomorphological terrain study, and a review of the current understanding of the archeology of eastern Kansas. Schmits defined research goals (1988:70) which form the basis of the 1993 Pomona Lake project. The goals can be divided into three major domains. First and most important to the other two is the refinement of the culture history of the project area. Second is the delineation of settlement-subsistence patterns. The third goal is formulation of a predictive model for site distribution in the project area.

The approved research design for the 1993 investigations is in part based on those goals developed by Schmits (1988:70-85) for surveys of the reservoir in 1982 and 1984. Research questions about the cultural resources in the vicinity of Pomona Lake have not changed substantively in the last decade. Further, continuity between this project and earlier ones is important; previous investigators reported 26 sites from the reservoir during the three systematic surveys of the reservoir between 1958 and 1992.

### **Field Survey Methods:**

The field investigative procedures used in 1993 followed Schmits (1988) model of survey transects as a sampling procedure. Transect sampling is a pedestrian field survey technique in which the surveyor traverses an area along a previously selected route while maintaining a constant distance between him/herself and other members of the survey crew (Chartkoff and Chartkoff 1980). The transect routes used at Pomona were linear or curvilinear because they followed contours between the 986.4 ft amsl level and the reservoir

boundary. Schmits determined distance between intervals by analyzing site sizes and spacing traverses so that the average-sized site could not fit between two adjacent transects. Spacing the intervals 35 m apart would increase the likelihood that a site would be found. Surveyors initially used 35 m transect spacing during the 1993 survey and maintained transects separated between 10 and 20 m intervals when the survey corridor narrowed.

The survey staff consisted of between three and six person teams with size depending on dimensions of specific survey areas. When surveyors encountered cultural debris, they recorded site size, materials collected, exact location and condition of deposit. They intensely examined small sites with little surface material and collected a small sample of materials present. Large sites with a great amount of debris on the surface were less intensely examined and were sampled with emphasis on the collection of diagnostic artifact types. Once surveyors located a site, they delimited the periphery by flagging artifact locations. Surveyors carried U.S.G.S. 7.5 minute quadrangle maps in the field for reference and used the maps to plot site locations. They shaded areas on the field maps to delimit surveyed parts of the project area.

Shovel testing was the main technique used in 1993 for locating sites in zones of poor surface visibility. Tests were spaced at 20 m intervals along each survey transect where ground cover was heavy. After examining fill from the shovel tests, surveyors immediately backfilled the holes.

Besides the field methodology discussed above, testing of historical sites involved documentary research including examination of land records, histories and atlases. These records provide information regarding the identity of the owners of historic properties and data with which to assess the significance of each property. The field methodology for historic sites did not deviate substantially from the procedures used on prehistoric sites. However, historic properties frequently contained structural evidence such as foundations, monuments, etc; which required more detailed mapping.

### **Laboratory Methods:**

With the above objectives in mind, the classificatory scheme used for lithics here combines elements of many techno-morphological and functional classificatory procedures. A principal objective of the approach is to develop a system to provide data regarding the use of lithic implements and at the same time permit the rapid classification necessary in a CRM project. The method presented here is a modified version of the analytical system developed by Chapman (1977).

The initial procedure used in the analysis of materials recovered at Pomona Lake during the 1993 field season involves a technological subdivision of the assemblage into categories based on the presence or absence of retouch and the type of retouch present (Chapman 1977).

Many functional tool classes can be recognized on the basis of morphology (shape), placement of working edge, edge shape and presence of edge damage or wear. These attributes serve to identify broad functional tool categories which can be associated with a specific prehistoric activity such as projectile points. Many tool categories, such as bifaces, could easily go through several stages of utilization: initially produced as a blank, then used as a knife and then as a projectile point preform. The classification of a tool is generally dependent upon the stage at which it enters the archeological record.

A second problem encountered in the analysis of lithic materials is that many tools show evidence of multiple functional uses, such as cutting wear on projectile points or knife wear on scrapers. Classification of multifunctional tools can be approached in several ways. On cultural resource management projects such as the present one where collections must be rapidly processed, it is often most efficient to assign the tool to its principal functional class, based on the total morphology of the tool. In this case, a projectile point with secondary evidence of knife wear would still be classified as a point.

#### **Chipped Stone Tool Classification:**

Bifacial tools exhibit primary invasive flaking on two surfaces. Primary flaking is the removal of large thinning and shaping flakes which significantly alter the outline or cross-section of the tool. Within the general category of biface, there are several functional classes separated by morphological characteristics and evidence of use.

Projectile points are pointed bifaces that have provisions for attachment to a shaft. Projectile points may have other uses as shown at Rodgers Shelter where Ahler (1971) found that tools generally classified as projectile points exhibited wear patterns indicative of other usages.

Haft element modifications can consist of side or corner notches, a basal stem or shoulder, or thinning of the base by removal of one or more large flakes. The presence of such modification indicates that the artifact was intended to be mounted on the end of a shaft for use as a piercing tool. However, some bifacial tools which do not exhibit definite hafting modifications, but whose size, outline and edge characteristics preclude most other uses, are traditionally classified as projectile points. Small, symmetrical, triangular bifaces with or without hafting modification, whose distal margins converge to a point, are referred to as arrow points. Generally, only projectile points sufficiently complete for typological classification can be discussed as projectile points. Projectile points are one of the most useful tools for identifying the temporal placement of sites.

Unifacial tools exhibit primary modification on either the ventral or dorsal surface. The other surface is unmodified or only marginally modified. Such retouch generally produces debitage and is directed toward the production of predetermined characteristics. Most



unifacially modified tools are end scrapers. These tools possess ovoid to subtriangular outlines with a steeply angled, excurvate working edge at one end and facial flaking over most of their dorsal surfaces. They are generally considered to be hide working tools.

Marginally retouched tools have subinvasive retouch and are classified as such when the retouch extends along more than one third of the perimeter of the tool. Marginally retouched tools include flake scrapers and perforators. Steep retouch characterizes flake scrapers, while piercing projections characterize perforators.

Edge-Modified Tools make up most of the artifacts from many sites and are informal implements which exhibit marginal retouch as deliberate flaking along one or more edge. This modification generally extends over less than one third of the perimeter of the artifact. It is usually confined to an area from 1-5 mm along the tool margin. These tools are usually subdivided into debitage categories such as edge-modified flakes or edge-modified chunks. Such tools will generally see one episode of use and will rarely be curated or maintained in their prehistoric context.

### **Lithic Manufacturing Debris:**

Lithic manufacturing debris comprises most of the assemblages recovered from investigated sites. Initially, material in this category will be further subdivided by technomorphological attributes into cores, chunks and debitage. In some instances cores, chunks and debitage will be subdivided into more specific categories characterizing the nature of lithic tool manufacture conducted at the sites. Definitions of classes of lithic manufacturing debris are presented below.

Cores are pieces of chert with patterned negative flake scars showing evidence of flake removals by either direct or indirect percussion. Within the general category of core, several morphological classes are recognized based on the size, shape, degree of platform preparation and flake scar patterning observed.

Chunks consist of angular multifaceted pieces of chert greater than 3 cm in maximum dimension. They exhibit none of the systematic flake removal associated with cores nor any of the morphological characteristics of flakes. Most represent trimming elements removed during the initial reduction of a core or material discarded as a waste by-product during lithic manufacture. Cortical chunks are simply chunks that exhibit one or more cortical surfaces showing the original outer surface of the raw material.

Debitage consists of generalized waste flakes and shatter detached by direct or indirect pressure or percussion during the reduction of cores and manufacture of chipped stone tools. Debitage exhibits no evidence of post-detachment modification such as intentional retouch or utilization.

Morphological characteristics such as striking platforms, bulbs of percussion and ripple marks characterize flakes. This category includes decortication flakes, intermediate flakes, bifacial trimming flakes and chips. Decortication flakes have a minimum dimension of 2 cm and exhibit at least 50 percent cortex on their dorsal surfaces. They represent the intermediate stages of lithic reduction and tool manufacture and include secondary decortication flakes and both primary and secondary trimming flakes. Bifacial trimming flakes are recognized by the presence of multifaceted platforms which exhibit characteristic 'lipping' of the striking platform over the vertical surface of the flake. These elements are very thin and possess small negative flake scars in their dorsal surface. Bifacial trimming flakes represent the final stage of lithic tool manufacture and maintenance. Chips are flakes less than 2 cm in maximum dimension.

Shatter is small irregular pieces of chert less than 3 cm in maximum extent with none of the characteristics of flakes. Shatter lacks evidence of conchoidal fracture and may result from breakage along the chert's natural cleavage planes, excess force applied during lithic reduction, heat treatment, treadage or noncultural factors such as freeze-thaw action. It is possible that some shatter represents unidentifiable flake fragments.

### **Ceramics:**

Ceramic identification will follow Butler and Hoffman's (1992) categories for Plains ceramic types and wares for ceramic bearing sites in the project area. Brown notes that only two of his Pomona phases, Clinton and May Brook, are represented at Pomona Lake. It may be possible to assign Pomona ceramics to specific typological units defined by Brown (1984). He assigns sites to the two phases based on characteristics of lip decoration and the frequency of shell tempering in each assemblage. Of the four Pomona phases defined by Brown, ceramics from the earliest have no lip decoration and little shell tempering. Sites of the later phases exhibit lip decoration and more shell tempering. The assignment of ceramics to Brown's taxa may contribute little to development of a cultural historical framework for the area because all the phases overlap temporally and one extends over the full temporal range of the culture.

### **Pomona Variant Ceramics:**

Wilmeth (1970:31-33) initially described Pomona ware ceramics. Kenneth Brown (1984:2-3;426-430) has elaborated these descriptions, looking especially at temper categories. Except for temper, Pomona vessels are typical of Central Plains tradition ceramics in rim form, surface treatment and decoration, with straight rims predominating. Rim height ranges from 25-50 mm (mean 40 mm). Small numbers of slightly flaring rims occur as do some extruded lip forms. Vessel forms usually are globular with a constricted orifice. Collared rims and bowls are rare, with collars that do appear being low, about 15

mm. Lips are usually rounded or flattened. Expansions of the rim below the lip are common. Decoration is rare but may include diagonal lip punctates and finger pinched nodes on outer margins of lips.

Rims are normally unthickened, rising vertically from the shoulder juncture and may be curved to flare out slightly. Collared rims have a characteristic mid-neck bulge creating an s-shaped cross section; sometimes actual thickening of the rim gives a wedged-shaped cross section. Most vessels are undecorated, but when decoration occurs it is usually confined to the area of the lip.

Sherds lack grit temper and are soft, with hardness from slightly below 2 to slightly below 4. Sherd thicknesses range from 3 mm to 10 mm. Many sherds are badly eroded. Color is a pale buff with an orange tinge, but some tan and brown also appear. Light gray is the dominant interior color. Grit temper is absent; the main tempering agent is clay and or potsherd. When the former, it is often inclusions that are flaky, sometimes with 'cell temper' where clay inclusions have dissolved out of the paste. In his dissertation, Kenneth Brown (1984:427-430) discussed temporal and spatial variations in Pomona ceramics which he suggests correspond relatively well to calibrated radiocarbon dates. Cordmarked lips, such as one from this site, 14OS145, occur most frequently in the southern and central regions of the Pomona Variant, including Osage County. Some spatial variability also occurs in tempering materials determined by geological constraints on local availability (Artz 1984). Sites in Osage County, for example, have high frequencies of non-tempered pottery as well as sherd and shell tempered vessels. Shell tempered vessels occur later in the variant, but no temporal variation is apparent in non-tempered and sherd-tempered vessels. Brown examined 5068 sherds and from this determined that there are no temporal or spatial trends evident from exterior surface treatment. He notes, in fact, that "it would be difficult to separate the body sherd assemblages for Pomona from those of earlier Plains Woodland components..." (Brown 1984:429).

### **Processing of Materials and Curation:**

The Kansas State Historical Society curates all materials collected from previous surveys of Pomona Lake and should curate materials from this survey as well. All materials recovered during 1993 are catalogued using procedures defined by the KSHS.

### **Site Evaluations:**

In making recommendations for the sites encountered during the Pomona survey, four basic criteria were utilized. These are: (1) physical condition of the site, (2) the site content, (3) its relationship to regional research questions, and (4) the expected impact on the site. The first three were used at Pomona to evaluate the potential of the site in

answering questions pertinent to the archeology of the region. The fourth was used in the process of making recommendations for mitigation, if required.

Site condition was based on the amount and nature of postdepositional disturbance. Factors such as plowing, construction activities, road building and natural erosion were taken into account. The site content was based on the archeological features or remains which have been recorded or which can be expected to be present, given the erosional and depositional conditions at the site. Included in the site content are such things as the presence or absence of a surface distribution, preservation of subsurface cultural deposits or features and the likelihood of recovering datable carbon, faunal or botanical remains or diagnostic artifacts. These factors and others were examined to determine which materials a future researcher might have to work with in further evaluation of the site. The knowledge gained about the particular site was examined in relation to the present knowledge about the region with regard to its potential for improving the data base regarding past human events in the area.

These three major factors taken together are useful in making a judgment as to the relative significance of a particular site. In the case of a site judged not significant, no further work was recommended. This does not mean the site is of no interest as an archeological manifestation, but rather that further work would not likely increase our knowledge base beyond that acquired in survey and testing. Destruction of these sites will, therefore, not seriously affect the data base for the region.

When a site judged to be significant, there are a limited number of options for mitigation. The preferred option is preservation (Wendorf 1978, King 1975, Lipe 1974) and in cases where this appears feasible, it was recommended. Preservation can include anything from simply withholding site location information, to active protection of the site dependent on the anticipated utilization of the area. Other options, in cases where planned activities will destroy or seriously endanger the site, may include data recovery by excavation. The form this excavation will take is up to the investigator charged with its excavation and is dependent on the nature of the site and the research collection. The orientations and knowledge of future researchers must guide the final mitigation plans.

## **Chapter 3: ENVIRONMENTAL CONTEXT**

### **Physiography and Topography:**

Pomona Lake, like much of the eastern part of Kansas, lies within the Osage Cuestas. The Osage Cuestas physiographic subprovince is a large area occupying most of southeast Kansas. Differential erosion of alternating layers of upper Pennsylvanian and lower Permian limestone and shales formed the Cuestas. The harder limestone strata form the uplands of each escarpe while the less resistant shale erodes more easily to form the lowlands between escarpes. The strata slope gently toward the west. Local relief ranges from 15 to 60 meters from the floodplains to the Cuesta uplands. Broad river valleys characterize the Osage Cuestas ranging from one to several kilometers in width.

### **Land Use:**

Pomona Lake contains 6501 acres of land above the level of the multipurpose pool (Corps of Engineers 1988). Land use within this area includes wildlife management, recreational parks, roads and private development. Wildlife management areas comprise approximately 4500 acres of land, most of which the Corps of Engineers manages through agricultural leases or contracts with local farmers (Corps of Engineers 1993:5). Eight Parks and one interpretive center (Pine Ridge) account for approximately 1479 acres of the total area above the multipurpose pool, leaving approximately 550 acres of combined usage, including private development. Carbolyn Park, Cedar Park, Dragoon Access Area, One Hundred and Ten Mile Creek Park, Michigan Valley Park, Management Park, Outlet Park and Pomona State Park are all areas of high potential for disturbance by campers, picnickers and others using the recreational facilities. The 1993 survey recorded only three archeological sites in high use areas during the project. Two of these are limited scatters, but NRHP testing is recommended for the third.

### **Geomorphology:**

Pomona Lake impounds the waters of Dragoon Creek and One Hundred and Ten Mile Creek, both tributaries of the Marais des Cygnes River. The lake lies within the Osage Plains, which has a dissected character due to alternating strata of limestone and shale. Erosion of the unequally resistant strata resulted in the creation of gently rolling topography with steep slopes near stream valleys.

Quaternary and Tertiary deposits cap Pennsylvanian and Permian limestones at Pomona Lake except where erosion exposed the latter on the surface (O'Connor 1955). Schmits reports that up to 90% of the alluvial valley fill is Holocene in age.

In eastern Kansas, most of the surface rocks formed during the Pennsylvanian period. The rocks are primarily limestones, shales and sandstones. Pleistocene and Holocene deposits cover much of Kansas. Alluvial and eolian deposits also occur throughout the state, as well as others formed by colluviation on slopes.

Various soils in Kansas reflect environmental factors responsible for their formation. Soils in the eastern quarter formed mainly on limestones, shales and sandstones. They are moderately deep loams. The soils formed under humid climatic conditions; mean annual precipitation ranged from between 75 and 100 cm (Dickey and Penner 1990).

Climates in the eastern half of Kansas are noted for hot humid summers and cold dry winters. Average annual precipitation may range from over 100 cm in the southeast to over 90 cm in the northeast. Most precipitation falls during the growing season, April through September (Self 1978:56). Temperatures vary from 30.1 degrees Fahrenheit in January to 78.3 degrees Fahrenheit in July. The growing season is 178 days with the frost free season extending from April 21 to October 16 (Robb 1941).

Kansas occupies an area variously referred to as the Great Plains, Interior Grasslands, or Prairie and Plains. Although the Interior Grasslands extend from Canada to Texas, there is much regional variation. Beginning with the Flint Hills region eastward, a tall grass Prairie extends to an eastern boundary with the Eastern Deciduous Forest. Eastern Kansas is characterized by a mosaic of forest and prairie (Kuchler 1974). Climate, fire, topography and soils have long controlled vegetation patterns of the state. Floodplain forests and savannah with tall grass prairie or mosaic forest in the uplands characterized the area now formed by the main body of the reservoir. Prehistorically, prairie, with trees restricted to stream banks, characterized most of the area surrounding Dagoon Creek and One Hundred and Ten Mile Creek. Walnut, elm, oak, hackberry, cottonwood and hickory formed most of the woods adjacent to the watercourses. In the past, game animals were plentiful in the area. Bison, elk, white-tailed deer and black bear, and many smaller fur-bearing animals were in the area (Hall 1955).

Due to the high water level in the reservoir during an unusually wet spring in 1993, survey conditions adjacent to the water level and extending to 1015 ft amsl were optimum. Wave action had cleared vegetation between the two contours making 90 to 100 percent of the surface area visible and, in some instances, cleared from 10 to 15' cm of deposit from the surface. Due to surface visibility, it is expected that any cultural remains present in the cleared area were encountered and recorded in 1993. In the more densely covered areas above 1015 ft amsl and the Corps boundary, surveyors encountered no remains, though they systematically shovel tested these areas and examined any erosional features encountered. Except for the remains of four historical structures, all sites recorded during the 1993 investigations occurred in areas where ground surfaces had been disturbed. Flooding, erosion and agriculture contributed to the removal of vegetation and surface deposits.

## **Soils:**

A soil survey of Osage County was not completed until after Pomona Lake filled. A geomorphological analysis conducted in 1984 (Schmits 1988:23) for Pomona Lake, relied on soil studies of nearby Melvern Reservoir on the Marais des Cygnes River. One Hundred and Ten Mile Creek and the Marais des Cygnes River are part of the same drainage system. The study relied heavily on O'Connor (1955) and Kopsick (1982) for identification of alluvial deposits in the Republican and Marais des Cygnes Valleys and extended these models into the Pomona project area. These studies defined two alluvial terraces that were upper Pleistocene or Tertiary in age. Of particular interest to the archeologist are the T-0 (floodplain) and T-1 terraces. The model predicts that Woodland and Archaic sites will appear on terraces of the appropriate age. The T-1 terrace is associated with Osage Series soils while the Verdigris soil appears to be the modern floodplain (T-0 surface). Archaic sites have been found on T-0 terraces at Melvern and Milford Reservoirs. At Pomona, one Archaic site was located on a T-0 terrace and one on a T-1 floodplain. Plains Woodland sites were distributed between T-0 and T-1 terraces. The presence of older sites on seemingly younger landforms suggested that either cultural affiliations of sites had been incorrectly identified or that the terraces had been incorrectly mapped. To resolve these discrepancies Mandel and Schmits remapped the terrain using soil maps. The terrain analysis indicated that the older T-1 terraces associated with Osage Soils are the slightly higher parts of the T-0 terrace or the floodplain. Their analysis of the soils indicated that Archaic and older cultures would be buried in the T-1 terrace with the T-0 containing materials dating from the present to 2500 years ago. They also predicted that the upland surfaces should contain the full range of artifacts from Paleo-Indian to historic Euroamerican (Schmits 1988:36).

## **Chapter 4: REGIONAL CULTURAL HISTORY**

The following is a brief cultural history of the Eastern Kansas area in which Pomona Lake lies (Table 2). A more detailed presentation of the temporal framework for the prehistory of Eastern Kansas and environs may be found in Adair (1988) or Brown and Simmons (1987).

### **Paleo-Indian (10000-6500 B.C.):**

Because materials from this widespread period are scarce in eastern Kansas, archeologists must often interpolate from materials found elsewhere in North America. Paleo-Indian cultures are the earliest known in the New World. The primary mode of subsistence was big-game hunting which centered on Pleistocene megafauna such as mammoth (*Mammuthus premigenius*). Artifacts from this period are scattered throughout the New World and share similarities in design.

Archeologists have identified three cultural complexes for the Paleo-Indian period outside eastern Kansas: Llano, Lindenmeier and Plano. Table 2 shows dates associated with each. A distinctive tool type characterizes each of the three complexes. Clovis points, a key indicator of the Llano period, exhibit flutes of varying lengths on their dorsal and ventral surfaces (Chapman 1975). The distinctive features of Plano cultures are long, slender projectile points or knives that often have collateral or ripple flaking. Folsom, a fluted tool complex, derives from a later development of Clovis (Chapman 1975:61).

As mentioned above, Paleo-Indian sites are not common in Eastern Kansas due to soil erosion, or possibly, minimal presence of the groups in the region. Reported finds from the state include isolated projectile points found in stream bottoms or gravel bars.

No surveys at Pomona have located Paleo-Indian sites, leading Schmits (1988:321) to conclude that given present data, the area was not occupied or at least not intensively occupied during Paleo-Indian times. Consequently, one major goal of Schmits' 1982-84 surveys was to locate Paleo-Indian sites. This goal guided the research conducted herein. The KPP outlines three areas of Paleo-Indian research. Two are culture historical, and the third is processual. The continuation of the development of a cultural-historical framework is an important part of this project because establishing temporal control is necessary for the development of any model dealing with settlement patterns or cultural systems.

### **The Archaic Period (6500 B.C.-A.D. 1):**

During the Archaic, new tool styles appear; lanceolate projectile points of the Paleo Indian tradition generally give way to Archaic stemmed and notched forms. This technological



shift may reflect the disappearance of large herd animals at the end of the Pleistocene and a shift toward more localized or regional foraging. Hunting and gathering directed at regional environments characterizes the predominant lifestyle during the Plains Archaic with regionalization in tool styles reflecting regional variation in subsistence activities and exploitation patterns.

Information for the Archaic Period, like its antecedents, is scarce at Pomona Lake with only two sites reported prior to the 1993 survey. Some of terraces on which seasonal activities may have focussed during the Archaic may be buried under colluvial materials eroded from the higher elevations (Mandel, in Schmits 1988).

One basic question addressed by this study concerns the scant evidence for the Archaic in Osage County. If these periods are so common in the High Plains to the west (Frison 1978) and east in Missouri (Chapman 1975), then why are they so rarely encountered at Pomona Lake? As noted in the Kansas State Plan and by Schmits, data are badly needed to determine whether this skewed distribution represents minimal occupation during the early periods, biases as a result of previous surveys (sampling methods) or the result of recent geomorphological processes. The KPP notes that the fluvial histories of the rivers are a key to understanding archeological context; continued work associating the geomorphology and prehistoric occupations within the reservoir can help assess these histories as part of predictive model development.

Though only defined at two sites in earlier surveys at Pomona, the Archaic Period in the region is known from Logan Creek and Munkers Creek materials (Table 2). The relationship between the Osage County materials and those in the rest of eastern Kansas has yet to be established. The identified Archaic sites at Pomona Lake (14OS309 and 14OS102) are similar to Plains Archaic with dart points and stemmed points as diagnostics. The small numbers of lithic specimens, however, precludes detailed comparison with other sites in the region (Schmits 1988:321).

Data from investigated Archaic sites such as Snyder (Grosser 1973), Williamson (Schmits 1980b) and Coffey (Schmits 1978, 1980a, 1981) indicate that these sites invariably occur in low depressional areas of the floodplain and are subjected to seasonal inundation. Insofar as can be determined, these sites appear to have been dry season extractive camps occupied by hunter-gatherers during the late summer and fall. Where are sites situated during other seasons, such as during the winter or during the spring and early summer when the lowlands were inundated by flooding? This question, posed by Schmits nearly a decade ago, is still valid. Because much of the land surveyed as a part of the 1993 project is upland, it was expected that such seasonal sites might be encountered in that context.

Work to the east in the Kansas City area on the Nebo Hill settlement subsistence pattern (Reid 1980, Reeder 1980) indicates the presence of dichotomous lowland (interpreted to be winter) and upland (interpreted as warm weather) occupations. Such a dichotomous

topographic positioning of settlements could hold for eastern Kansas as well. Little survey work of the uplands in the project areas of Pomona Lake has been conducted, and only one Archaic site has been located there. This survey of Pomona project areas included areas mostly outside the lowland floodplain areas, and the substantially greater amount of slopes and upland topography presented a greater opportunity than earlier surveys to determine the full range of locations used for Archaic settlements (Adair 1988 and Brown and Simmons 1987).

Johnson (1992) recently raised the questions of whether sites identified as Late Archaic might actually be a part of an Early Woodland connection with spatial extensions as far west as the Flint Hills. These components may have substantial eastern connections.

### **Plains Woodland (Early Ceramic) (A.D. 1-900):**

The introduction of pottery, burial mounds and horticulture define this period. The introductions of cultigens such as maize, and the storage capabilities of ceramic vessels in which to store and prepare foodstuffs, provided elements necessary for the beginnings of sedentism.

Generally, the Woodland period in eastern Kansas includes two major cultural traditions, Plains Woodland and Hopewell (Table 2). Artifact styles similar to those found in the Kansas City and central Missouri areas characterize Hopewell occupations found in eastern Kansas. This cultural manifestation appears to be the result of the westward migration of Hopewellian populations from the Illinois River Valley (Johnson 1976). Plains Woodland represents the second and more widespread Woodland cultural tradition. In the eastern part of Kansas, Plains Woodland groups include Grasshopper Falls, Greenwood and Cuesta phases. Plains Woodland groups likely represent a development begun in early Archaic groups.

Many culture historical questions remain concerning Plains Woodland and Plains Village occupations of the area. While thirteen sites belong to these broader periods, it is rarely possible to assign the sites in question to more precise prehistoric cultural units. As defined in the KPP, a number of Early Ceramic phases proposed for the Osage Cuestas include the Cuesta phase, Greenwood phase, Wakarusa phase, Deer Creek phase, and Hertha phase. Although Schmits suggested that one site in the reservoir area was Greenwood phase and recommended it for nomination to the NRHP, he was unable to clarify the temporal position and social relationship between this and other complexes in eastern Kansas. Similarly in 1993, the two sites with identifiable cultural affiliations also lack temporal and social links to the rest of eastern Kansas.

For the most part, explicit statements regarding settlement patterns have been made only for areas adjacent to eastern Kansas, although Reynolds (1979:73) has characterized the

settlement pattern from the Grasshopper Falls phase as consisting of small isolated clusters of nuclear households or individual nuclear households occupying terraces adjacent to secondary drainages. He states that a sedentary lifestyle is indicated with at least part-time residence each year in domestic houses of some permanence. Henry (1979:59) has suggested a less sedentary settlement pattern for Plains Woodland populations to the south in the Hominy Creek Valley of north central Oklahoma. He characterizes this pattern as a centrally based circulation pattern with small social groups present during summer/autumn and large group aggregation during other seasons.

### **Plains Village (Middle Ceramic) (A.D. 900-1500):**

Agrarian-based societies characterize this period. Larger site sizes and more extensive deposits of cultural debris provide ample evidence that the degree of sedentism was increasing. Subsistence activities include the storage of seasonal foods for times of scarcity and a focus on local game animals from the immediate environs of the site. Two groups most likely associated with the Pomona Lake region at this time are the Steed-Kisker farmers and the Pomona Variant. Steed-Kisker farmers are mentioned because of the new site found near the region (Ranney, pers. comm. 1994).

Pomona fits into the seam between traditional Plains Village and Plains Woodland. Ceramics and ample evidence of horticulture suggest a Plains Village subsistence pattern. However, house forms are small round or oval post and lath structures that have grass and mud coatings. These attributes suggest Plains Woodland affinities (Schmits 1988).

Pomona Variant is the only Middle Ceramic culture defined for the Osage Cuestas. Five sites assigned to Pomona appear in the Pomona Lake project area. Schmits drew no conclusions about the relationship of these sites to other complexes. Witty (1978) has suggested that the Pomona material represents a development from earlier Plains Woodland patterns in eastern Kansas, such as Grasshopper Falls and Greenwood phases. The KPP (Brown and Simmons 1987:XIII-34) notes that the reason for the sudden disappearance of the Pomona Variant at A.D. 1450 is not well understood. As well, the relationship between Pomona sites and Central Plains tradition, especially Smoky Hill sites, is poorly understood. Most recently, Johnson (1992) has argued that the Pomona Variant is possibly ancestral to the Kansa. The Historic Kansa, who were in the northern part of the province, represent the Late Ceramic Period. Historically, the Kansa, Osage and other immigrant tribes were in the region.

In the Pomona Lake area, Plains Village tradition Pomona Variant sites are located on the T-0 floodplain of One Hundred and Ten Mile Creek near the dam axis (Wilmeth 1970). The Harsh site, a Pomona site in nearby Melvern Lake area, was located on the floodplain of Stevens Creek, a tributary of the Marais des Cygnes (Moore and Birkby 1964). Dead Hickory Tree, a Plains Village site in John Redmond Reservoir, occupies a position on the

floodplain of the Neosho River (Schmits *et al* 1980). To the east on the Little Blue drainage in Jackson County, Missouri, May Brook phase Plains Village sites occur in low depressional areas of the floodplain and appear to represent late summer and fall extractive camps rather than sites occupied over a long period (Schmits 1980d).

#### **Protohistoric (Late Ceramic) (A.D. 1500-1700):**

The first contacts between indigenous North American populations and Europeans occurred during the Protohistoric period (Schmits 1988). The Spanish were the first to establish contact with the native peoples of the region in 1541. The French followed the Spanish in 1724 when Bourgmont encountered natives living in the area (O'Brien 1984). The Kansa, Pawnee and Wichita are the three regional Protohistoric complexes that may have influence in the Pomona Lake region.

Early historical records indicate a lack of occupation of the Pomona project area prior to movement of Kansa Indians into the region in the early nineteenth century. Dates from some Pomona focus sites range from 1550-1600 A.D. suggesting that Plains Village Tradition cultures survived into the Protohistoric periods (Schmits *et al* 1980). A question arises concerning the identity of these cultural units during the Protohistoric and their identity by the advent of the Historic Period. The aboriginal inhabitants of Osage County during the Historic periods include the immigrant Sac and Fox. These groups were experiencing acculturation into Euroamerican society, but few data are presently available regarding the material aspects of Sac and Fox life. Wilmeth (1970) noted that the Sac and Fox graves at the Masenthin site were atypical for historically recorded graves of the Sac and Fox. The 1993 survey identified one possible Sac and Fox site.

#### **Historic (A.D. 1700-Present):**

By the 1830s, the resettlement of eastern Native American groups was underway in Kansas, but by 1870 most of these groups had been resettled elsewhere (Lees 1989:71). The Sac and Fox occupation of the reservoir area is one such example of this pattern. In 1846, a Sac and Fox reservation had been established in part of the project area. By 1854 the region became a part of Kansas Territory (Wilmeth, 1958:7). The Sac and Fox were removed to Oklahoma during the 1860s due to the pressures of white settlement into newly established Osage County (Lees 1989:79-80). Evidence of Sac and Fox occupations in the reservoir is found at five sites. Although specific dates are lacking in most instances, Historic Euroamerican sites have been identified at seven locations (Wilmeth 1958 and Ziegler 1992).

For purposes of cultural resources management, the following chronological contexts are identified in the KPP for the Historic Period (Lees 1989:69-75) Exploration and Contact

with Native Kansans, 1541-1820; Period of Exploration and Settlement, 1820-1865; Period of Rural/Agricultural Dominance, 1865-1900; Time of Contrasts, 1900-1939 and the Recent Past, 1939-Present.

In summary, the archeological record at Pomona Lake largely mirrors the rest of eastern Kansas and appears to reflect an indigenous development from a series of Archaic to Plains Woodland cultures to Plains Village to historically known tribes or cultures, then into the Historic record. Schmits (1988:324) hypothesized that it is possible that more cultural groups were present in the Pomona Lake area than current data show. He also suggested that many of the culturally 'ambiguous' sites might be placed in cultural context with survey, excavation and analysis of materials, both existing and new. This survey added 14 new sites to the list and recommends additional work where warranted. More precise definition of the Pomona Lake area culture historical sequence is extremely important in answering questions concerning culture change and process.

Table 2. Culture-Historical Complexes of Osage County.

Period	Dates	Culture Phase in Osage County	Representative Sites
Historic	A.D. 1800	Euroamerican Settlement (1869- present) Sac/Fox (1846-1868)	14OS302
ProtoHistoric	A.D. 1500		
Plains Village	A.D. 1000	Pomona (A.D. 960-1430)	14OS109 14OS145
		Grasshopper Falls (A.D. 500-1000)	14OS363
Plains Woodland	500 B.C.	Greenwood (A.D. 400- 900)	14OS104 14OS347
Archaic	2000 B.C.	Munkers Creek (B.C. 3550-3050)	14OS347 14OS102 14OS309
	5000 B.C.	Logan Creek (B.C. 3250- 4210)	14OS17?
Paleo-Indian	6500 B.C. 10000B.C.	Plano (B.C. 5000-8000) Lindenmeier (B.C. 9000- 8500) LLano (B.C.10000-9000)	

## Chapter 5: SITE DESCRIPTIONS

### The 1993 Survey:

Surveyors from the University of South Dakota Archaeology Laboratory recorded 14 previously unidentified archeological sites in the project area during the 1993 field season (Figure 2). Of these, ten are prehistoric and the remaining four are from the historic period. Three of the four historic sites are of Euroamerican origin, and one may represent the brief Sac and Fox occupation of the area between 1846 and 1867.

In addition to the ground survey, survey teams consulted soil and landform maps and interviewed private collectors. John Perney, State of Kansas Wildlife and Parks employee, indicated that there was 'no material in the area' and that all sites that he was aware of had been inundated. Frank Hanson, another collector interviewed, has worked in the area since the late 1950s prior to dam construction. His knowledge of sites in the area was limited to some of those that were inundated and several that had been previously reported. Neither of the two individuals interviewed provided new information concerning sites in the reservoir.

High water levels at Pomona Lake during an unusually wet spring in 1993 made survey conditions from water level to 1015 ft amsl optimal. Submergence and wave action had cleared vegetation between the two elevations, making from 90 to 100 percent of the surface area visible. In some instances, a shelf or bench formed by wave action at the maximum lake level indicates that up to 25 cm of the ground surface had been removed.

Due to excellent surface visibility in 1993, it is expected that if cultural remains existed on the surface of the scoured area, they were recorded. The remainder of the project area above 1015 ft amsl and the Corps boundary was covered in places by thick vegetation with surface visibility ranging from 0% to 50%. In these areas, only a single prehistoric site was recorded (14OS144) even though field surveyors shovel tested all areas above this elevation and examined all erosional features present. Earlier surveys of the reservoir area by Wilmeth and Schmits concentrated on areas below 1015 ft amsl. Wilmeth also contacted local land owners as did the 1993 surveyors. With the single exception mentioned above, neither the local inhabitants nor the survey crew in 1993 identified sites at elevations above 1015 ft amsl. Either prehistoric sites do not exist above the scoured area noted in 1993, or, if they do, then the techniques used to find them (e.g. shovel testing and survey) are inadequate. If the testing techniques are, in fact, adequate, the fact that prehistoric sites appear to be lacking in these areas suggests that the extreme elevations and steeper slopes of the uplands were little used in prehistory. An alternative explanation is that the steep slopes found between the floodplain and hilltops were utilized by prehistoric peoples, but that erosion of these areas was more extreme than in the less steep valley margins and bottoms.

Of the ten prehistoric sites recorded during 1993, only two may be assigned a cultural affiliation based on the presence of diagnostic artifacts. One of the prehistoric sites, 14OS145, is assigned a Pomona Variant affiliation based on the presence of cord roughened ceramics and a small triangular projectile point. The presence of a large corner notched projectile point in the collection from the Pomona site suggests that a Plains Woodland component may be present there. A large fragment of a stemmed projectile point present at 14OS151 allows that site to be assigned a Plains Archaic affiliation. Collections from the eight other prehistoric sites recorded in 1993 consist of flakes or materials too fragmentary to allow for assignment of cultural affiliation at this time.

In the project area, surveyors encountered two sizes of lithic scatters (Table 3). Scatters fall into two categories based on the maximum extent of surface distributions. Small scatters are less than 5 m in maximum extent and extensive scatters are those greater than 25 m in maximum extent. No lithic scatters fit between the small and extensive size categories.

#### **Testing of Sites:**

As specified in the Scope of Work for the 1993 project, shovel testing and examination of erosional features provided the primary means of examination of subsurface deposits. Shovel testing and examination of erosional features in 1993 made it possible to delimit the horizontal and vertical extent of scatters, but the Scope of Work provided for a single 1 m by 1 m test if additional subsurface information was needed to determine if NRHP testing was warranted.



# POMONA LAKE

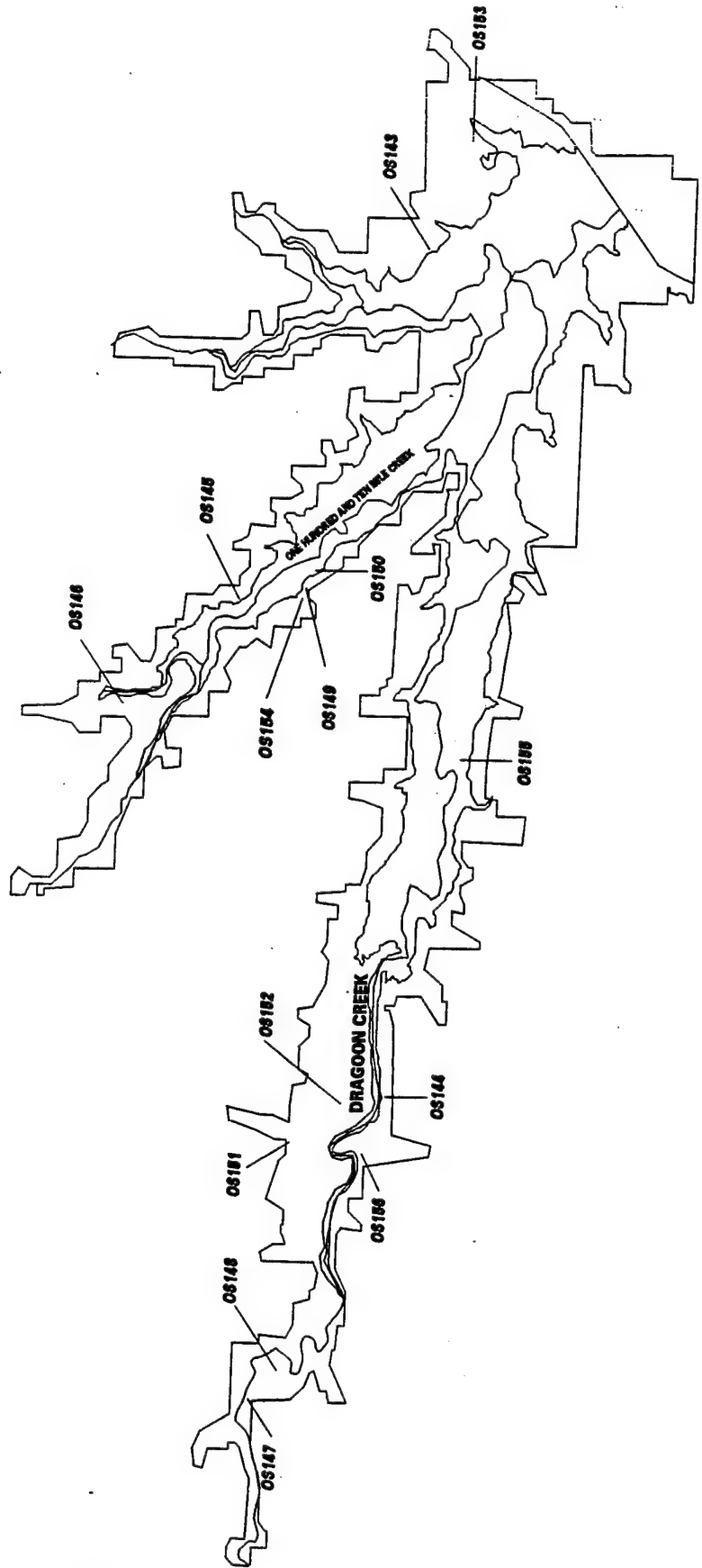


Figure 2. Sites recorded in 1993.

Table 3. Summary of Sites Located During the 1993 Survey at Pomona Lake.

Site	Cultural Affiliation	Materials Collected	Site Size
14OS143	Unknown	Retouched Flake and Core	Within a 3 m radius
14OS144	Unknown	Flakes Noted on Surface	50 m X 15 m
14OS145	Plains Village/ Woodland	Ceramics, Flakes	50 m X 40 m
14OS146	Unknown	Flakes	68 m X 11 m
14OS147	Unknown	Projectile Point Tip, Flake	Within a 3 m radius
14OS148	Unknown	Projectile Point Fragments, Chunk	100 m X 40 m
14OS149	Unknown	Preform Fragment, Flake	5 m X 2 m
14OS150	Unknown	Flakes	10 m X 6 m
14OS151	Archaic	Biface and Flakes	23 m X 30 m
14OS152	Unknown	Bifacial Tool	5 m X 10 m
14OS153	Historic Euroamerican	Concrete Foundation	Corner of a foundation: 3 m X 4 m
14OS154	Historic Euroamerican	Dry Laid Masonry Walls	'L' shaped foundation and lower walls formed by adjoining rooms 5 m X 17 m and 5 m X 15 m. A foundation (icehouse?) 5 m X 2.5 m.
14OS155	Historic Sac/Fox	None Collected	22 m X 10 m
14OS156	Historic Euroamerican	Rock and Concrete Foundations	Structure: 32 m X 28 m

## 14OS143

**Field No:** FS1

**Type of Site:** Small Lithic scatter

**Cultural Affiliation:** Unknown

**Topographic Setting:** Osage Cuestas

**Parent Material:** Pennsylvanian Limestone and Shale

**Drainage:** Valley Brook

**Recording Agency:** University of South Dakota Archaeology Laboratory

**Site Size:** 3 m in diameter

**Surface Visibility:** 90-100%

**Slope:** 6%

**Slope Direction:** Southwest

**Ground Cover:** Sparse grasses

**Survey Date:** 21 Sept 1993

**Nearby Sites:** 14OS106, 14OS110, 14OS111, 14OS302, 14OS303, 14OS304, 14OS305, 14OS306, and 14OS367

**Land Use:** Public use - Wolf Creek Recreation Area

**Elevation:** 985 ft (300.2 m) amsl

### Site Description:

This site is a small lithic scatter located in Wolf Creek Recreation Area on gently sloping land facing Valley Brook. Surveyors discovered artifacts at an elevation of 985 ft amsl in a location that overlooks the Valley Brook Valley to the east. The area presently lies within public use campgrounds. High reservoir levels extending to 1015 ft amsl stripped vegetation from areas adjacent to the water's edge. At the time of discovery, only scattered vegetation debris covered the site making visibility nearly 100%. The only lithic material noted at the site was contained within an area 3 m on a side. Surveyors noted one retouched flake, two other flakes, a brown chert fragment and a core at the site. The collection removed from the site consists of only the retouched flake and the core. Surveyors examined the ground surface adjacent to the area where the artifacts were noted and found no evidence of additional material. A single shovel test in the center of the concentration indicated no subsurface material.

### Nearby Sites:

All of the following distances are approximate. Site 14OS106 is less than 800 m to the northwest on the same side of the tributary, 14OS110 is 1.2 km to the northwest on the same side of the tributary, 14OS111 is less than 1.6 km to the northwest on the same side of the tributary, 14OS302 is 2 km southeast on the floodplain, 14OS303 is 1.6 km

to the southwest, 14OS304 is less than 1.6 km to the southwest on the floodplain, 14OS305 is nearly 2 km to the southeast on the floodplain, 14OS306 is nearly 2 km to the south east on the floodplain, and 14OS367 is 1.2 km to the northwest on the same side of the tributary.

#### **Materials Recovered:**

Surveyors recovered two artifacts from this site. One is a core of fossiliferous Permian chert and is olive gray in color. It does have a cortex. The second is a retouched flake fragment made up of Mississippian chert and is pinkish gray in color.

#### **Existing Impacts:**

Because the site is located in Wolf Creek Park and is within 6 m of the shoreline existing impacts to the site include shoreline erosion and disturbance by fishermen.

#### **Potential Impacts:**

Potential impacts to the site would include vandalism because the land use type is designated as 'Recreation-Intensive Use'

#### **Recommendations:**

This site is an extremely small scatter of surface material with limited content. Cultural and temporal placement of the site cannot be addressed because no diagnostic artifacts were noted or collected. Based on the types of material collected, activities conducted at the site were probably restricted to stone tool manufacture. The lack of integrity of the site as indicated by the results of the shovel test and the limited nature of the scatter make the site of limited potential use to address regional research questions. Due to minimal artifact content, the site is not recommended to be eligible for National Register nomination.

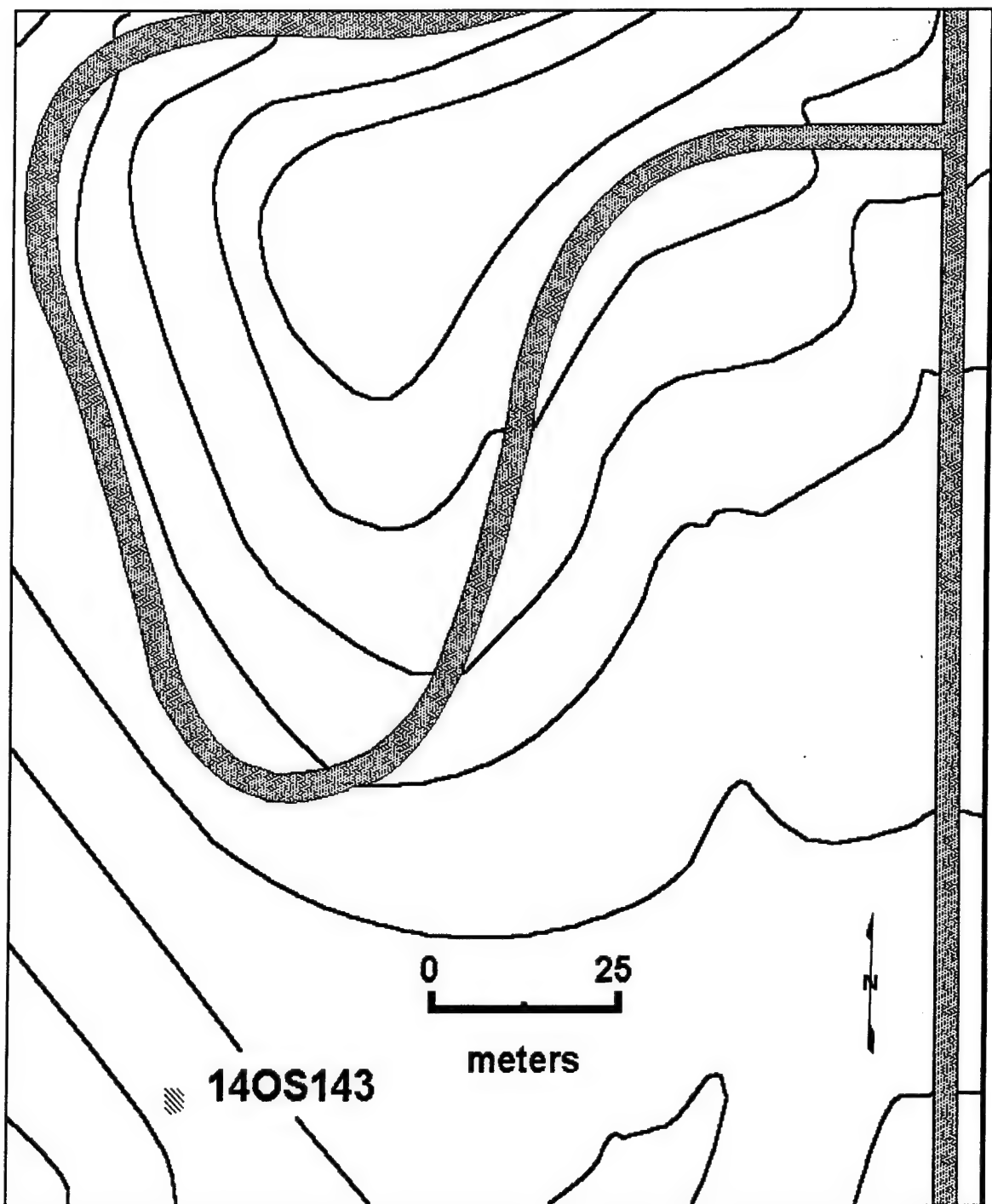


Figure 3. Map showing the location of 14OS143.

## 14OS144

**Field No:** FS2

**Type of site:** Large lithic scatter

**Cultural Affiliation:** Unknown

**Topographic Setting:** Osage Cuestas

**Parent Material:** Pennsylvanian Limestone and Shale

**Drainage:** Dragoon Creek

**Recording Agency:** University of South Dakota Archaeology Laboratory

**Site Size:** 50 m north-south by 15 m east-west

**Surface Visibility:** 70-85%

**Slope:** 12%

**Slope Direction:** Northwest

**Ground Cover:** Non-indigenous grasses and Riverine Forest trees

**Survey Date:** 29 Sept 1993

**Nearby Sites:** 14OS104, 14OS108, 14OS109, 14OS151, and 14OS152

**Land Use:** Public use

**Elevation:** 1025 ft (312.4 m) amsl

### Site Description:

This site is a light scatter of flakes on a grass covered slope in Carbolyn Park. The site slopes northwestward toward the lake. The site measures approximately 50 m north-south by 15 m east-west. Vegetation at the location consists of non-indigenous grasses and trees. With the exception of a small earthen mound at the northeast end of the scatter, very little of the land is undisturbed. Maintenance personnel at the reservoir management office indicated to the survey crew that the site consisted of fill from the construction of roads, buildings and campsites in the park. The only cultural materials noted on the surface of the site were small flakes scattered throughout with no apparent concentrations. Due to the disturbed nature of the site, surveyors noted lithic materials but made no collection. A shovel test placed near the center of the scatter indicated no subsurface cultural material.

Surveyors encountered an earthen mound adjacent to and north of a lithic scatter. Some limestone was noted protruding from parts of the mound. Surveyors conducted no subsurfacing testing at the mound because they suspected that it might contain human remains. The mound measures approximately 8 m north-south by 13 m east-west and projects approximately 80 cm above the slope of the site.

**Nearby Sites:**

All of the following distances are approximate. Site 14OS104 is 800 m to the northwest on the same side of the creek on the floodplain, 14OS108 is slightly over 2 km to the southeast downstream on the same side of the creek, 14OS109 is nearly 2 km to the southeast downstream on the same side of the creek, 14OS151 is 1.6 km to the northwest across Dragoon Creek, and 14OS152 is 800 m to the north across Dragoon Creek.

**Materials Recovered:**

Surveyors noted only eleven fragments of lithic debris, including shatter and flakes, but none were collected. Materials on the surface did not include any diagnostic materials which might aid in the temporal or cultural placement of the site.

**Existing Impacts:**

Construction activities destroyed this site when buildings and roads were built in the park.

**Recommendations:**

This site has limited content and has been disturbed by construction within the park. Results of a shovel test and examination of erosional features at the site failed to indicate the presence of subsurface materials. Due to the lack of integrity, the site is of limited potential for addressing regional research questions. Based on the minimal artifact content and lack of subsurface integrity, the site does not meet the requirements to be eligible for the National Register.

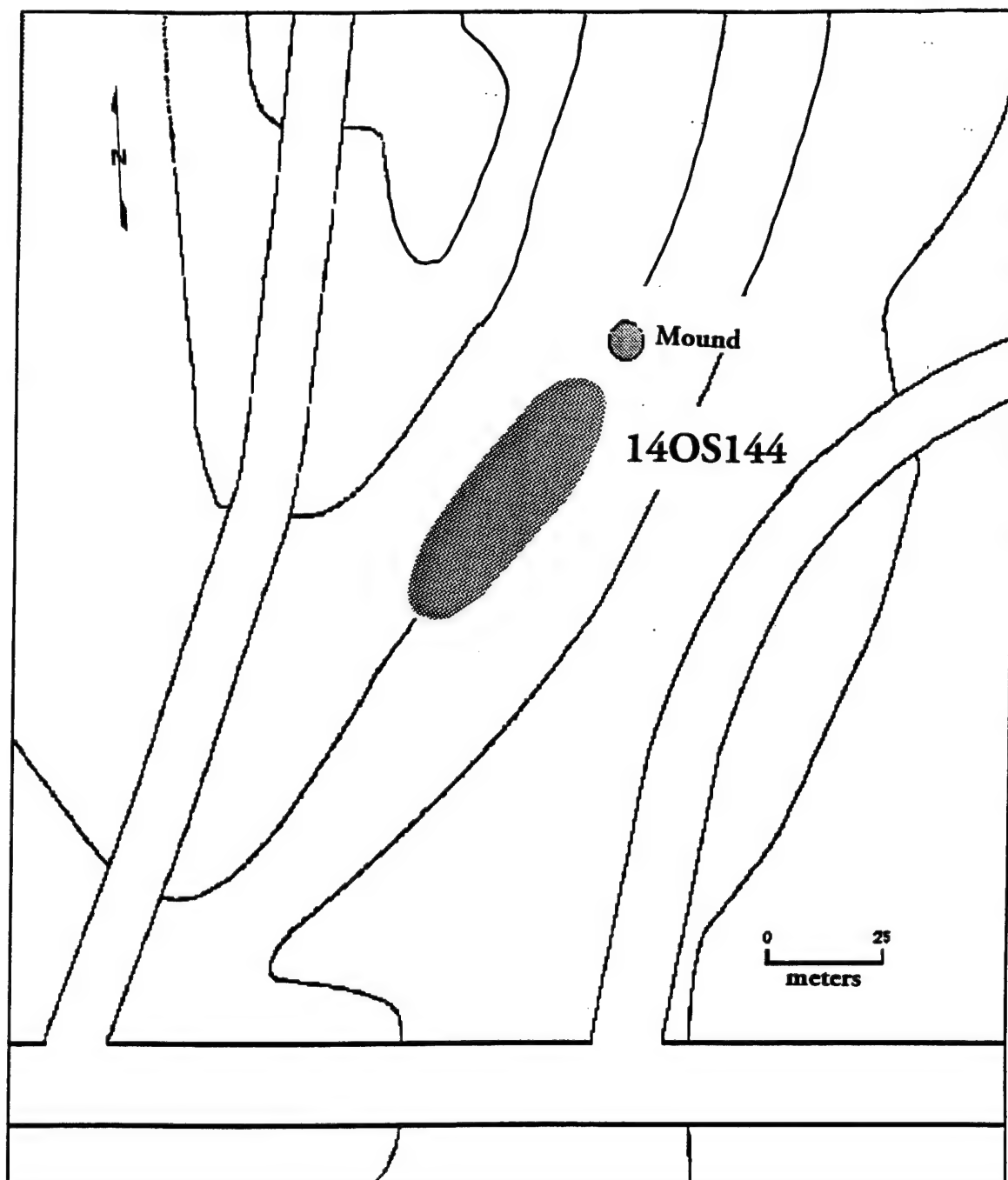


Figure 4. Map showing the location of site 14OS144.



## 14OS145

**Field No:** FS3

**Type of Site:** Habitation site

**Cultural Affiliation:** Plains Village (Pomona)/Plains Woodland

**Topographic Setting:** Osage Cuestas

**Parent Material:** Pennsylvanian Limestone and Shale

**Drainage:** One Hundred and Ten Mile Creek

**Recording Agency:** University of South Dakota Archaeology Laboratory

**Site Size:** 50 m north-south by 40 m east-west

**Surface Visibility:** 85-100%

**Slope:** 4%

**Direction of Slope:** Southwest

**Ground Cover:** Removed by high water

**Survey Date:** 25 Sept 1993

**Nearby Sites:** 14OS146, 14OS149, 14OS150, 14OS308, and 14OS350

**Land Use:** Public use

**Elevation:** 982 ft (299.3 m) amsl

### Site Description:

This large site is located on both sides of a road at the western limits of Cedar Park Recreation Area. This site is the largest and contained the densest scatter of materials recorded during the 1993 field season. Flakes, lithic tools, ceramics, debitage, and flaking debris were evident on either side of an east-west road which divides the site into northern and southern halves. The scatter extends approximately 25 m to the north and 25 m to the south of the road. The land slopes gently toward the southwest and is on the eastern edge of One Hundred and Ten Mile Creek Valley. Cultural debris was collected up to the water's edge and are assumed to extend beneath the water. The east-west boundaries of the site extend up to 40 meters away from the water's edge toward the east. However, the east-west extent is probably greater because it is assumed that the deposit extends below the surface of the water. Site dimensions are reliable because recent high reservoir levels removed vegetation from the site surface making surface visibility 100%. To determine if subsurface portions of the site were present to the north, surveyors placed two shovel tests at the perimeter of the site in that direction. Shovel tests produced no lithic materials at depths greater than 20 cm below the surface.

### Nearby Sites:

All of the following distances are approximate. Site 14OS146 is 2 km to the northwest across the stream, 14OS149 is 800 m to the south across the valley, and 14OS150 is 800

m to the south across the valley. Cultural affiliations of the three have not been determined. Two nearby sites, 14OS308 and 14OS350, are Plains Woodland sites and may have affinities with the Plains Woodland component at 14OS145. The location of site 14OS308 is 2 km to the southeast across and downstream of the creek, and the two parts of 14OS350 are approximately 400 m to the north and northwest across the creek valley.

### **Materials Recovered:**

#### **Ceramics:**

Surveyors collected 75 sherds from 14OS145. Four are rim sherds and 71 are body sherds. Four of the body sherds, due primarily to thickness, are likely identifiable to Plains Woodland, but the remainder fall well within definitions for Pomona Variant pottery. The four rims and three body sherds with unique surface treatment are illustrated.

#### Rims:

The four rims recovered are relatively small fragments. All are straight rims, though one is slightly S-shaped.

#### **Rim 1 (Figure 6a):**

This rim has a slightly thickened, extruded, flat lip. The lip is 9.7 mm wide immediately moving to 7.3 mm wide. The rim has vertical cord impressions up to the edge of the lip where the cord impressions are smoothed over in a 2 mm wide band. The estimated orifice diameter at the lip is 12 cm. A single, diagonal, smoothed-over cord mark is present on the flat lip surface. Paste is buff, with an orange tinge and a light gray core. Non-temper is small clay inclusions.

#### **Rim 2 (Figure 6b):**

This rim is lightly S-curved, giving an impression of a collar. The lip is 3.9 mm thick moving to the 'collar' which is 7.5 mm thick, narrowing to 6.8 mm in thickness at the neck. The estimated orifice diameter at the lip is 20 cm. The rim height is 24 mm. Paste is buff to orange with a light gray core. Temper is clay inclusions. The exterior of the rim is marked with regularly spaced, smooth-over, vertical cord impressions. The interior of the sherd is very rough.

#### **Rim 3 (Figure 6c):**

This rim exhibits substantial exterior surface erosion. Rim form is straight and out-flaring. Thickness at the lip is 6.1 mm; at the midsection, 6.6 mm and; at the neck, 8.0

mm. Rim height is 30 mm. Estimated orifice diameter is 14 cm. The exterior of the rim is vertically cord marked, with the impressions smoothed over. Paste is buff, with a light gray core containing visible clay inclusions.

#### Rim 4 (Figure 6d):

This rim is a straight, outflaring rim, 24.2 mm high. Rim thickness from lip to neck is 5.6 mm. The diameter of the orifice at the lip is 12 cm. The only visible surface treatments are a few vertical, smoothed-over cord impressions. Paste is buff to orange with a light gray core very much like the other rims. The interior is very smooth in contrast to the other rims.

#### Body Sherds:

Seventy-one body sherds make up the surface collection, but only 68 had classifiable characteristics. The others were small and badly eroded. Paste of the sherds is nearly identical, with buff/orange to dark brown coloration. The sherds are all non-tempered, that is, one can see only clay inclusions. There is a noticeable size difference in these inclusions with the size of those in the thicker sherds about two or three times that of the thinner fragments. The 68 sherds were classified by surface treatment.

##### Smoothed-over cord impression

*Number 52 Thickness Range: 2.9-8.3 mm Average: 5.7 mm*

##### Punctate with incised lines (Figure 6e)

*Number 1 Thickness 7.0 mm*

##### Single-cord impressed (Figure 6f)

*Number 2 Thickness 10.1 mm (one sherd undetermined)*

##### Zoned/single cord impressed (Figure 6g)

*Number 1 Thickness - exfoliated and undetermined*

##### Thin Plain

*Number 8 Thickness Range: 3.2-8.0 mm Average: 5.5 mm*

##### Thick Plain

*Number 4 Thickness Range: 15.0-15.1 mm Average: 15 mm  
(2 eroded and no thickness measured)*

The 14OS145 ceramics mirror other classic Pomona Variant collections. Rim forms, paste/temper and surface treatments fit well into Brown's descriptions of central or southern Pomona Variant sites. The only variation from this is the single-cord, zoned body sherd which resembles Kansas City Hopewell ceramics. The sherd, however, is so small and exfoliated that little can be determined from it. Several plain, smooth body sherds are thick and resemble Plains Woodland sherds from the area. There would be nothing unusual about this because, as Brown notes, Plains Woodland seems to grade into Pomona Variant.

### **Lithic Artifacts:**

Two types of raw material are present in the collections: Pennsylvanian chert and Permian chert. Schmits (1988:257) refers to these as local brown and gray cherts. Surveyors attempted to collect specimens that showed the entire range of raw material variations at the site during the 1993 survey. Diagnostic artifacts and tools were also collected.

### **Projectile Points:**

A nearly complete specimen is a corner notched point with a bi-convex cross section and convex base. It lacks a distal tip and is made of grayish orange Pennsylvanian chert (Figure 7a). The next specimen is an unnotched, small triangular (Fresno) point. It is made of light gray Permian chert (Figure 7b). The next is a distal fragment of a corner notched projectile point with a convex base (Figure 7c). It shows evidence of heating and has cortex on one surface. Every edge of this specimen, except the base, shows damage. It is grayish orange Permian chert. The fourth specimen is a medial fragment of a small, notched projectile point with serrated edges (Figure 8b). The tip and the base below the notches are missing. It is made of moderate yellowish brown Permian chert.

### **Bifaces:**

Three specimens are distal ends of bifaces or projectile points (biface tips or projectile point knives). All three are bi-convex. One specimen is yellow orange banded chert (Figure 8d), and the other two are made of light olive gray fossiliferous Permian chert (Figure 7e). The next specimen is a large biface, roughly ovate in form and made from a large tabular chunk (Figure 8a). It is made of yellowish brown Pennsylvanian chert. One lateral margin has a sinuous edge, while the other margin has secondary retouch to straighten the working edge. The ventral, dorsal and base margins are cortex. The next specimen is a complete ovate biface with lenticular cross section (Figure 8c). It is composed of pale orange fossiliferous Permian chert. The next two specimens are biface fragments of reddish Permian chert (Figure 7f).

### Unifacial Tools:

One specimen is the distal fragment of a wide end scraper. The lateral margins are retouched. It is made of yellowish brown Pennsylvanian chert. The next specimen is a unifacial tool with notching on one lateral margin and a graver on the other lateral edge (Figure 7d). It is of light olive gray Permian chert with cortex.

### Flakes:

Ten flakes, a small core and an angular chunk show evidence of tool manufacture and utilization at 14OS145. Five of the flakes and one core are yellowish brown Pennsylvanian chert (Figure 13a,b). Four show evidence of heating, one shows evidence of retouch, and three show signs of utilization. The core is irregularly shaped and shows indications of having been heated. Permian chert is the raw material of five flakes. Two of these specimens show evidence of retouch and three show utilization. All but one of these specimens show evidence of heating, and two specimens have cortex. One angular chunk of the same raw material was also recovered.

### **Interpretation:**

Diagnostic lithic specimens collected from 14OS145 support the cultural affiliations arrived at by the analysis of ceramics: that a Plains Woodland component and a Plains Village component are present at the site. Projectile points show similarities to those collected at other Plains Village and Plains Woodland sites in the reservoir. Specifically, the lithic sample collected at 14OS145 shows similarities to materials collected from other Plains Village sites. The small triangular projectile point resembles specimens from 14OS106, and the serrated specimen resembles those from 14OS109 (Schmits 1988:249). The corner notched specimens bear a close resemblance to those from the Plains Woodland sites components at 14OS362 in nearby Melvern Reservoir (Schmits 1988:228).

### **Existing Impacts:**

Because the site is located in Cedar Park and extends into the lake, existing impacts to the site include shoreline erosion and disturbance by fishermen.

### **Potential Impacts:**

Potential impacts to the site would include vandalism because the land use type is designated as 'Recreation-Intensive Use.' Maintenance of the road which bisects the site also poses a threat to the deposit.

**Recommendations:**

This site should be tested to determine its NRHP status. The limited testing performed in 1993 only established the horizontal limits of the site and that materials extended to depths of 20 cm below the ground surface. Testing should focus on determining the vertical limits of the site on both sides of the roadway and on the delineation of the Plains Woodland and Pomona components.

**Research Questions for NRHP Testing at 14OS145:**

Many culture history questions remain concerning Plains Woodland and Plains Village occupations of the reservoir area. While thirteen other sites can be assigned to these broader periods, it is rarely possible to assign sites to more precise prehistoric cultural units. As defined in the Kansas Preservation Plan, a number of Early Ceramic phases have been proposed for the Osage Cuestas including the Cuesta phase, Greenwood phase, Wakarusa phase, Deer Creek phase, and Hertha phase. Although Schmits suggested that one site in the reservoir area was Greenwood phase and recommended it for nomination to the NRHP, he was unable to clarify the temporal position and social relationship between this and other complexes in eastern Kansas. Research at 14OS145 could be directed toward this problem

In the Pomona Lake area, Plains Village tradition Pomona focus sites are located on the floodplain of One Hundred and Ten Mile Creek near the dam axis (Wilmeth 1970). The Harsh site, a Pomona site in the Melvern Lake area, was located on the floodplain of Stevens Creek, a tributary of the Marais des Cygnes (Moore and Birkby 1964). Dead Hickory Tree, a Plains Village site in John Redmond Reservoir, was located on the floodplain of the Neosho River (Schmits et al. 1980). To the east on the Little Blue drainage in Jackson County, Missouri, May Brook phase Plains Village sites are located in low depressional areas of the floodplain and appear to represent late summer and fall extractive camps rather than sites occupied over a long period (Schmits 1980d). Further information is required regarding the range of Plains Village settlement patterns in eastern Kansas. In particular, a determination of whether the sites were occupied on a year round or seasonal basis is needed. Testing at 14OS145 may provide information as to season of occupation.

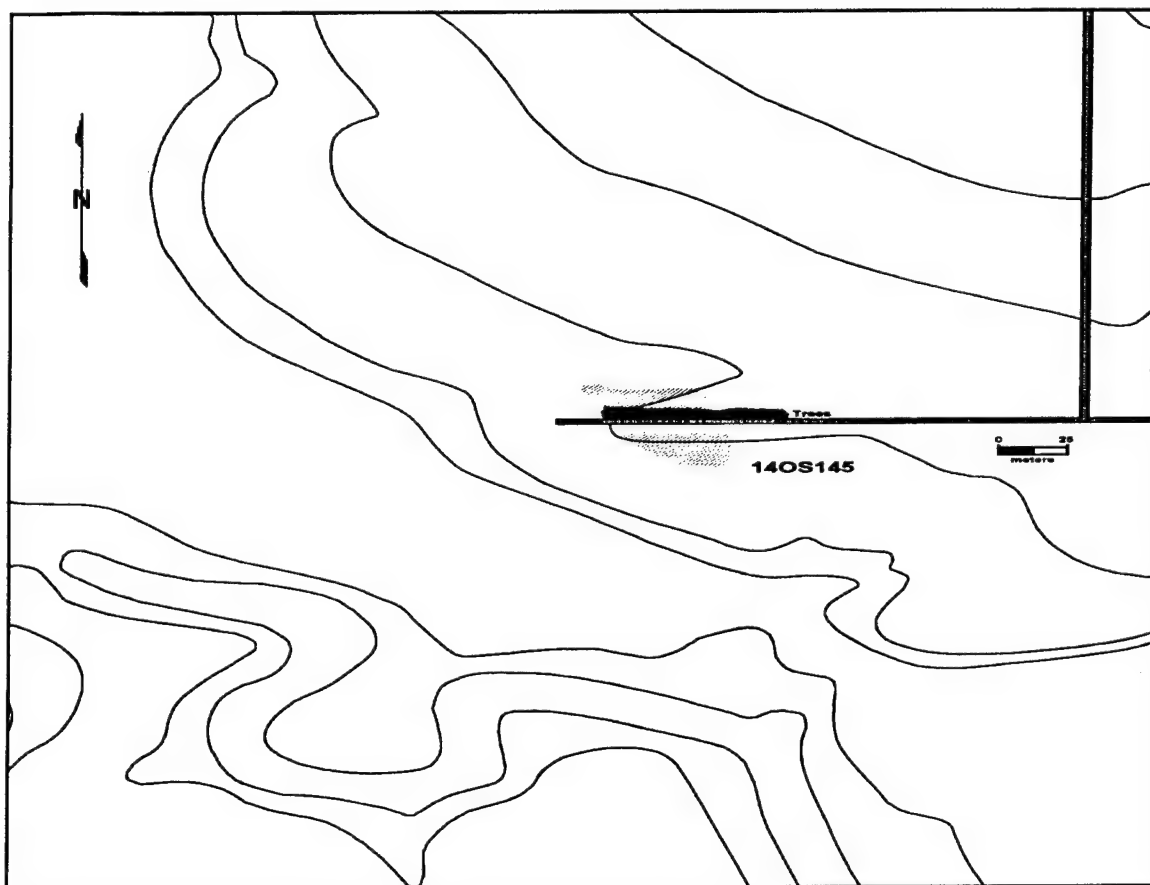


Figure 5. Map showing the location of site 14OS145.

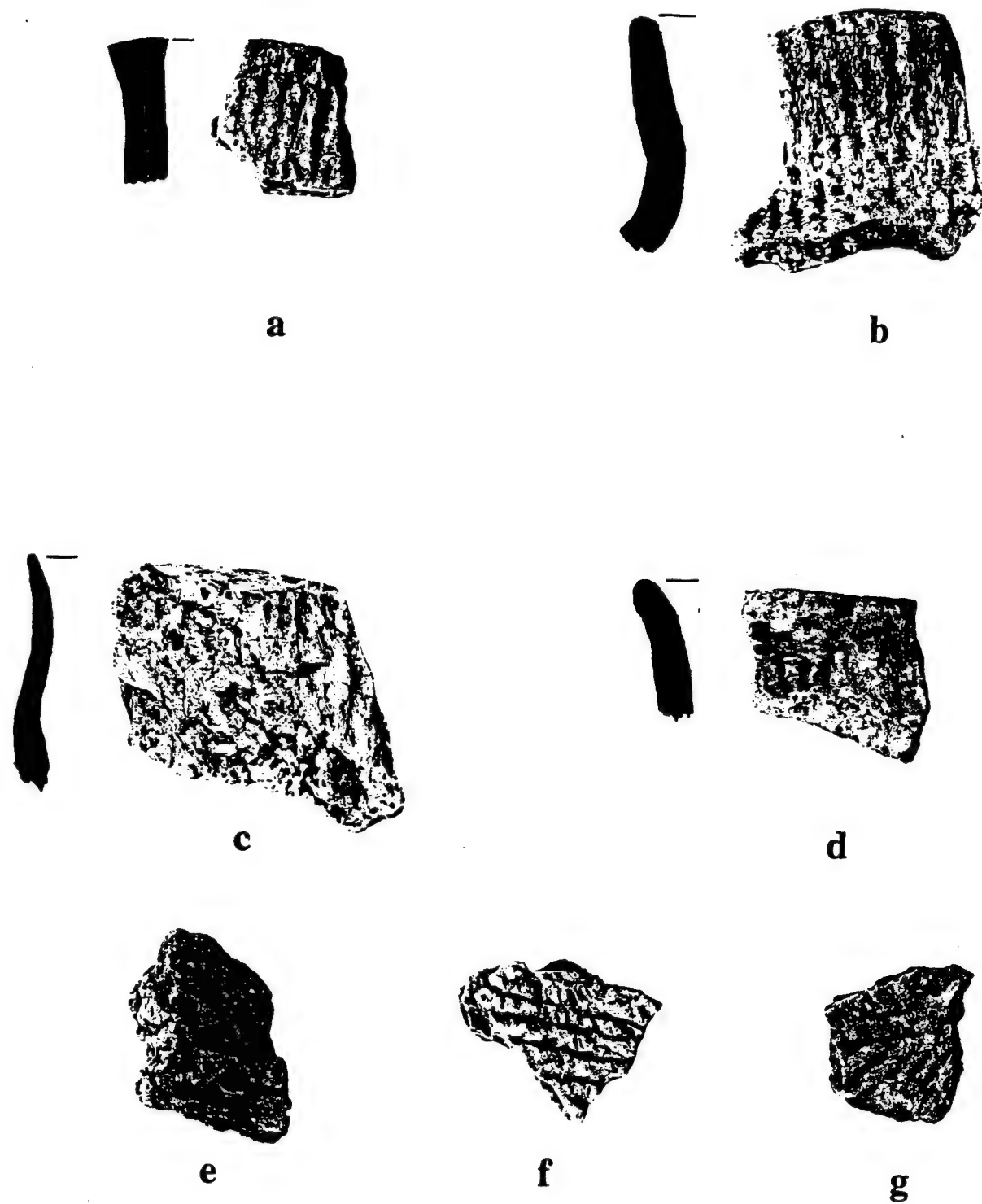


Figure 6. Ceramics from 14OS145.



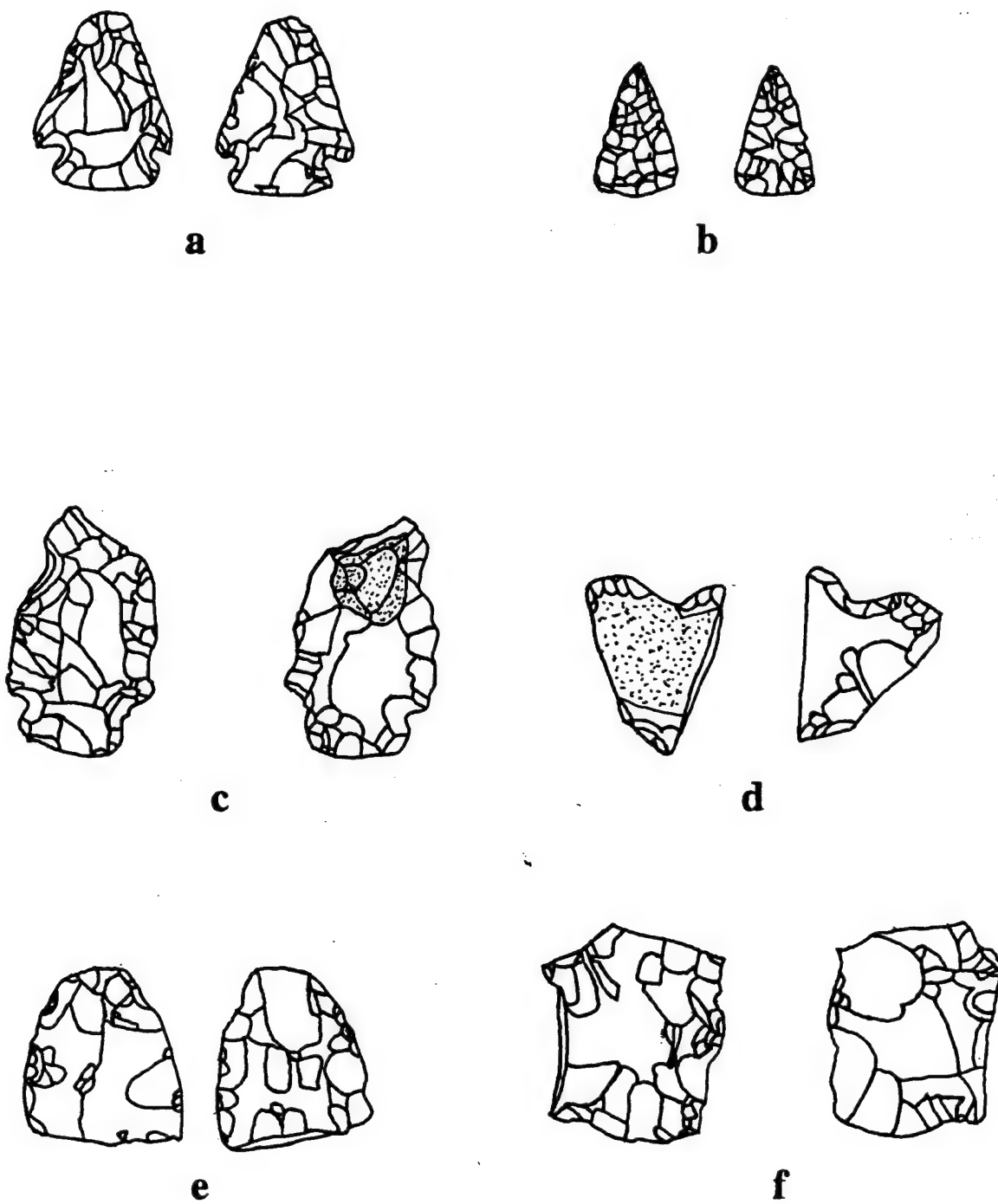


Figure 7. Chipped stone artifacts from 14OS145.

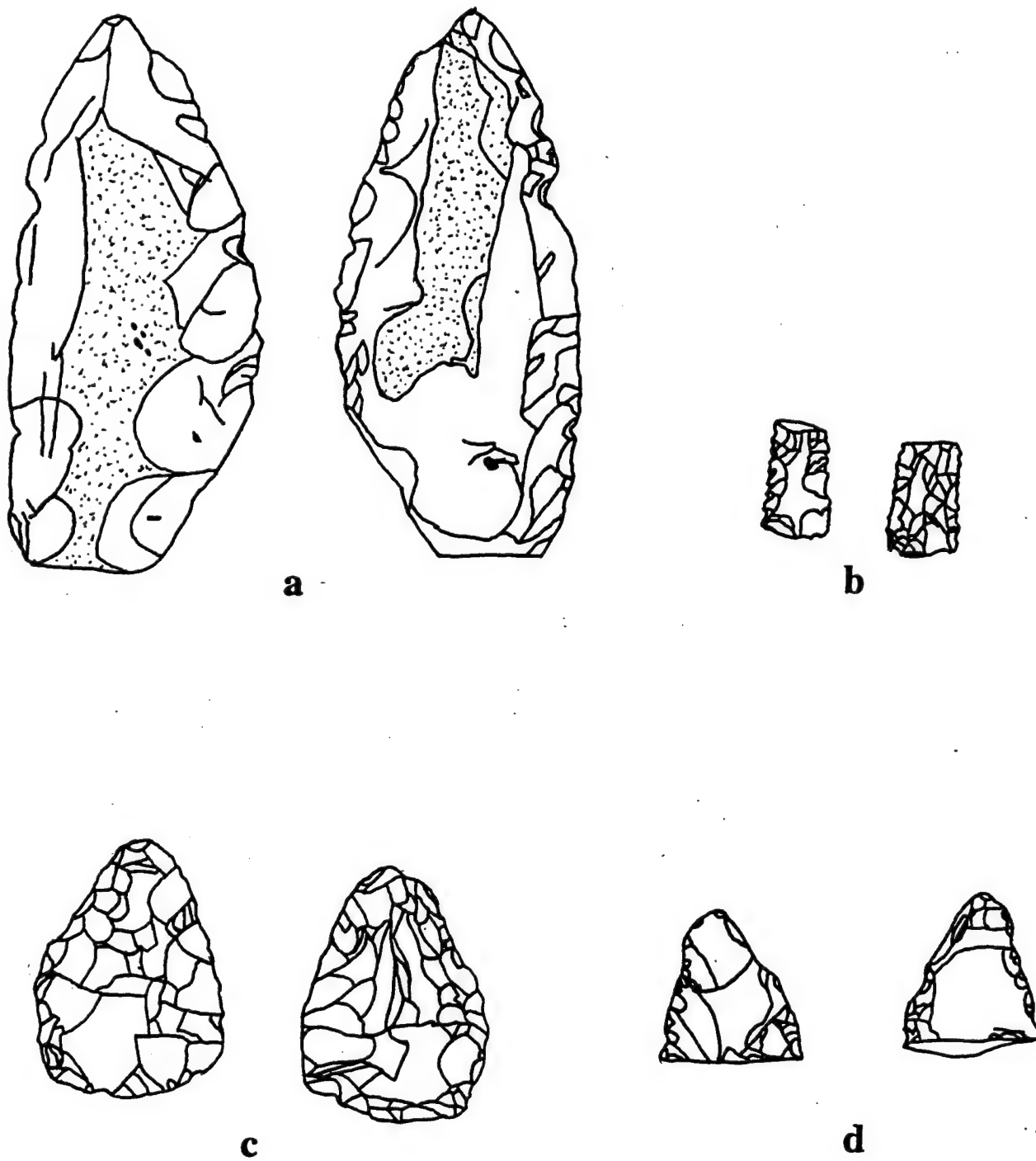


Figure 8. Chipped stone artifacts from 14OS145.

## 14OS146

**Field No:** FS4

**Cultural Affiliation:** Unknown

**Topographic Setting:** Osage Cuestas

**Parent Material:** Pennsylvanian Limestone and Shale

**Type of Site:** Extensive lithic scatter

**Recording Agency:** University of South Dakota Archaeology Laboratory

**Drainage:** Juncture of Plummer Creek and One Hundred and Ten Mile Creek

**Site Size:** 68 m north-south by 11 m east-west

**Surface Visibility:** 90-100%

**Slope:** 9%

**Slope Direction:** Southeast

**Ground Cover:** Cultivated field

**Survey Date:** 5 Oct 1993

**Nearby Sites:** 14OS145 and 14OS350

**Land Use:** Agriculture

**Elevation:** 995 ft (303.3) amsl

### Site Description:

Surveyors found a large lithic scatter on a southeasterly trending slope north of the junction of Plummer and One Hundred and Ten Mile Creeks. The site is on an eroded terrace adjacent to farmland at an elevation of 995 ft amsl. At the time of the survey, the area was cultivated, making visibility near 100%. Flakes occurred in an area approximately 68 m north-south by 11 m east-west in the cultivated field. Immediately to the west of the cultivated area and upslope from the site, heavy tree growth and waist high vegetation restricted visibility. Two shovel tests, excavated in the area of heavy ground cover to determine if the site extended in that direction, produced no subsurface cultural materials. Shovel test results indicate that the site is restricted to the cultivated field.

### Nearby Sites:

All of the following distances are approximate. Nearby sites include 14OS145 which is slightly over 2 km to the southeast, and the two parts of 14OS350 are approximately 1.6 km and 2 km to the southeast.

### Materials Recovered:

Surveyors collected eight artifacts at this site: an end scraper (Figure 13f) and seven flake fragments, six of Pennsylvanian chert and one of fossiliferous Permian chert. One flake is

grayish orange with cortex present, three are yellowish brown in color and have been heat treated, another is reddish brown with evidence of heat treating, yet another is a yellowish brown bifacial thinning flake and the last is a yellowish brown Pennsylvanian chert flake which shows evidence of heat treating. The eighth specimen is a 'thumbnail' end scraper with marginal retouch on the lateral edges. A flake served as a blank for the scraper and has the remnant of a striking platform on one end. The tool is made of fossiliferous Permian chert and is medium light gray in color with evidence of cortex. Unfortunately, end scrapers of this type are not diagnostic of a particular culture in the area.

#### **Existing Impacts:**

Agricultural practices pose the major threat to this site. It has been shown that agriculture caused noticeable damage to at least five previously reported archeological sites in the project area (Traub 1978; Schmits 1988; Ziegler 1992) and five sites recorded during 1993.

#### **Potential Impacts:**

Because the site is not located at the end of an arm of the lake, only a minimal threat is posed by scouring and wave action if the reservoir level is raised above 995 ft amsl.

#### **Recommendations:**

Shovel tests placed adjacent to the cultivated field failed to produce evidence of subsurface materials, but the size of this scatter and the density of materials on the surface warrants removal of the site from agriculture to preserve what remains.

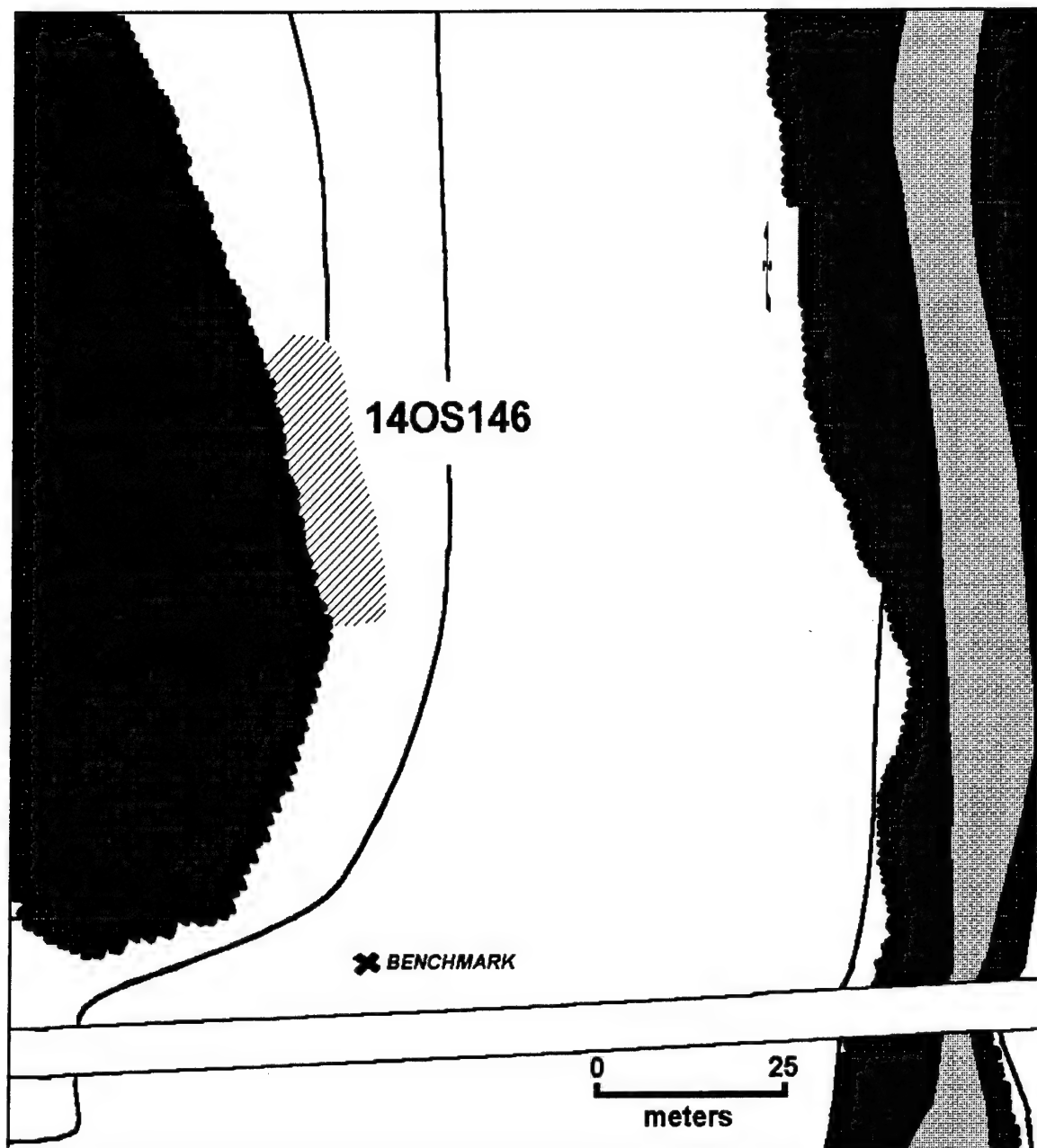


Figure 9. Map showing the location of site 14OS146

## 14OS147

**Field No:** FS5

**Cultural Affiliation:** Unknown

**Topographic Setting:** Osage Cuestas

**Parent Material:** Pennsylvanian Limestone and Shale

**Type of Site:** Small lithic scatter

**Recording Agency:** University of South Dakota Archaeology Laboratory

**Drainage:** Dragoon Creek

**Site Size:** 3 m in diameter

**Surface Visibility:** 90%

**Slope:** < 2%

**Slope Direction:** North

**Ground Cover:** Cultivated field

**Survey Date:** 6 Oct 1993

**Nearby Sites:** 14OS101, 14OS102, 14OS103, and 14OS148

**Land Use:** Public use

**Elevation:** 992 ft (302.4 m) amsl

### Site Description:

Surveyors noted a lithic scatter in a cultivated field immediately south of Dragoon Creek at the western end of the reservoir where water levels are confined to the creek channel. The site is located on gently sloping terrace near the creek. The scatter is southeast of a Corps benchmark and 10 m west of a north-south section road. It is at an elevation of 992 ft amsl. The site is an isolated findspot with flakes and a medial point fragment noted approximately 3 m apart. Recent high water restricted surface visibility to 80%.

### Nearby Sites:

All of the following distances are approximate. Site 14OS101 is 2 km to the southeast across the creek, 14OS102 is 1.2 km to the southeast on the same side of the creek on the same floodplain, 14OS103 is approximately 500 m to the northwest upstream and across the creek, and 14OS148 is 600 m to the southeast on the same floodplain.

### Materials Recovered:

Surveyors recovered two artifacts from this site. One is a thick, light gray decortication flake of Permian chert. The second specimen is a medial projectile point fragment which shows heavy utilization. It is made of light olive gray Permian chert.

**Existing Impacts:**

Agricultural practices pose the major threat to this site. It has been shown that agriculture caused noticeable damage to at least five previously recorded archeological sites in the project area (Traub 1978; Schmits 1988; Ziegler 1992) and five sites recorded during 1993.

**Potential Impacts:**

Because the site is located at the extreme western end of the reservoir only a minimal threat is posed by scouring and wave action if the reservoir level is raised above 992 ft amsl.

**Recommendations:**

This site is an extremely small lithic scatter with limited content. Nothing was found in the location except for the two artifacts noted above. Cultural and temporal placement of the site cannot be addressed because no diagnostic artifacts were noted or collected. Activities conducted at the site were probably related to stone tool manufacture. The lack of integrity of the site makes it of limited potential use to address regional research questions. The site is not recommended to be eligible for nomination to the National Register.

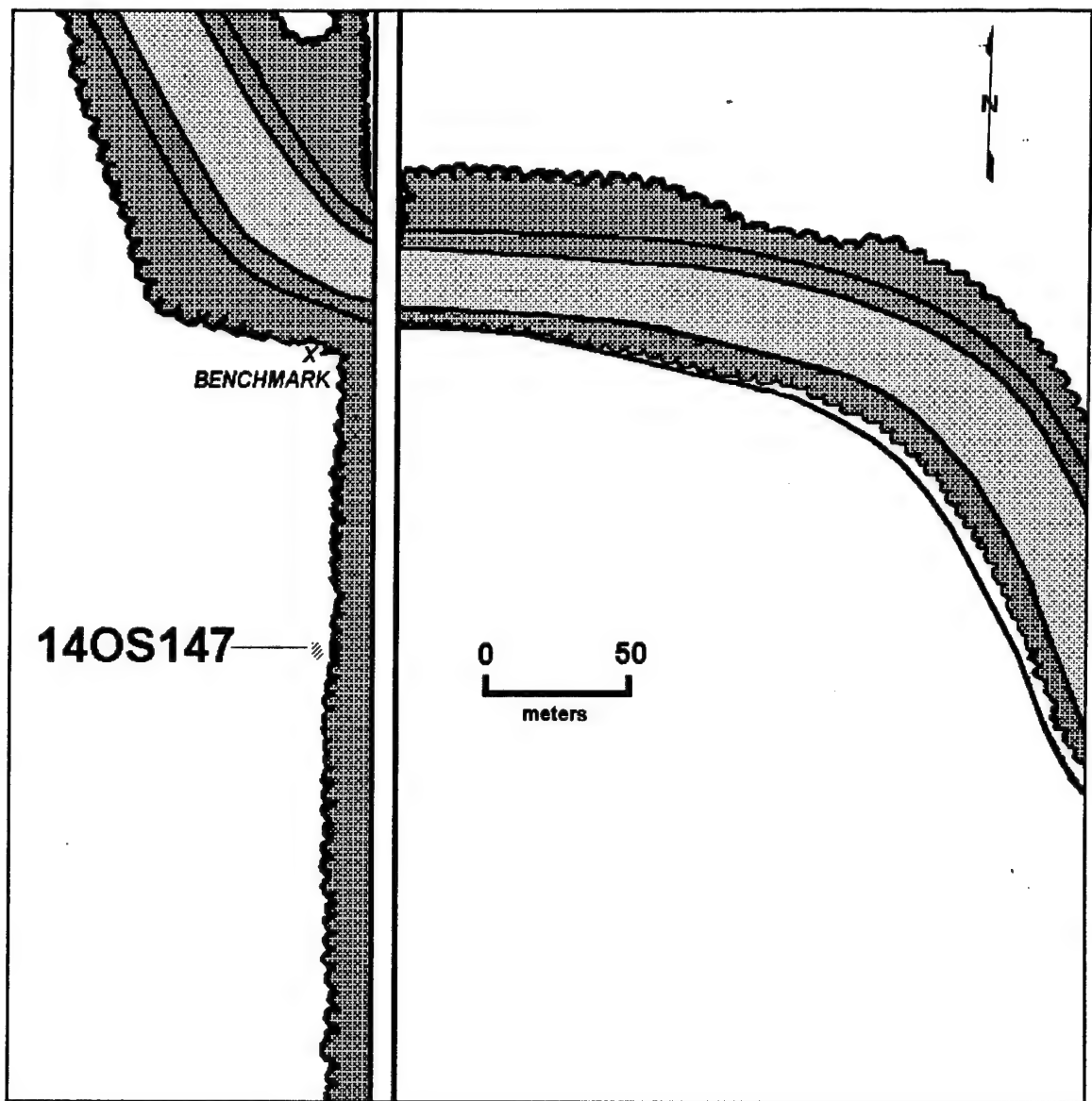


Figure 10. Map showing the location of site 14OS147



## 14OS148

**Field No:** FS6

**Cultural Affiliation:** Unknown

**Topographic Setting:** Osage Cuestas

**Parent Material:** Pennsylvanian Limestone and Shale

**Type of Site:** Extensive lithic scatter

**Recording Agency:** University of South Dakota Archaeology Laboratory

**Drainage:** Dagoon Creek

**Site Size:** 100 m north-south by 40 m east-west

**Surface Visibility:** 80-90%

**Slope:** Level

**Slope Direction:** None

**Ground Cover:** Cultivated field

**Survey Date:** 6 Oct 1993

**Nearby Sites:** 14OS101, 14OS102, 14OS103, and 14OS147

**Land Use:** Public use

**Elevation:** 995 ft (303.3 m) amsl

### Site Description:

Surveyors encountered a lithic scatter in a abandoned meander in the Dagoon Creek floodplain surrounded on all but the west side by the present creek channel. The site extends 100 m north-south along the shallow swale which averages 40 m in width (east-west). Lithic materials recovered from the site included a utilized chunk, two biface midsections, and a reworked point. Flakes were noted throughout the site area, but lacked an apparent concentration. Because the area surrounding the site was cultivated, visibility was between 80 and 90%. The surface limits of the site are well established because, no material was encountered in the area surrounding the meander. Two shovel tests placed near the center of the abandoned meander produced no subsurface materials.

### Nearby Sites:

All of the following distances are approximate. Site 14OS101 approximately 1.6 km to the southeast across the creek, 14OS102 is 800 m to the south on the same floodplain, 14OS103 is slightly more than 800 m to the northwest upstream and across the creek, and 14OS147 is 600 m to the northwest on the same floodplain.

### Materials Recovered:

Surveyors recovered four lithic artifacts from this site. One specimen is a core that demonstrates heavy step fracturing on two of the edges. The core is Pennsylvanian chert

and is light olive gray in color with cortex. The next three items are medial fragments of knives or projectile points. One is significantly larger than the other two and has been marginally retouched on one of the lateral edges (Figure 13c). It is grayish orange pink Mississippian chert with evidence of heating. One of the smaller specimens is Pennsylvanian chert and is yellowish brown in color. The remaining specimen is Permian chert and is moderately reddish orange in color (Figure 13d). There is evidence of heat treating and a probable impact fracture on the distal tip. The specimen is 14 mm in width, suggesting that it is an arrow point.

#### **Existing Impacts:**

Agricultural practices pose the major threat to this site. It has been shown that agriculture caused noticeable damage to at least five previously recorded archeological sites in the project area (Traub 1978; Schmits 1988; Ziegler 1992) and five sites recorded during 1993.

#### **Potential Impacts:**

Because the site is located at the extreme western end of the lake, scouring and wave action are not a problem even if the reservoir level is raised above 995 ft amsl.

#### **Recommendations:**

Shovel tests placed in the meander failed to produce evidence of subsurface materials. An examination of numerous erosional features and a stream bank at the northern limit of the site also failed to show evidence of subsurface deposits. Removal of the field from agriculture is recommended to preserve what remains of the site.

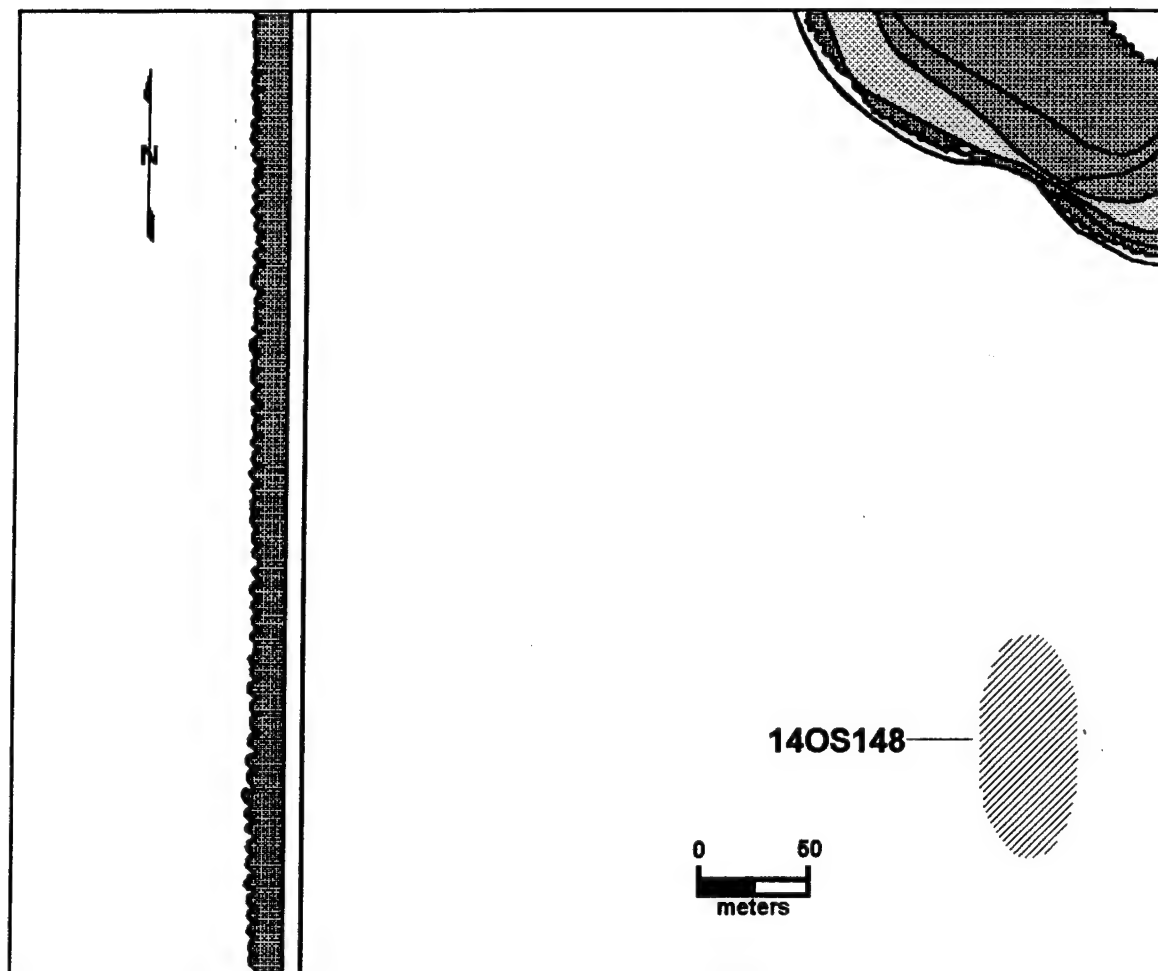


Figure 11. Map showing location of site 14OS148.

## 14OS149

**Field No:** FS7  
**Cultural Affiliation:** Unknown  
**Topographic Setting:** Osage Cuestas  
**Parent Material:** Pennsylvanian Limestone and Shale  
**Type of Site:** Small lithic scatter  
**Recording Agency:** University of South Dakota Archaeology Laboratory  
**Drainage:** One Hundred and Ten Mile Creek  
**Site Size:** 5 m north-south by 2 m east-west  
**Surface Visibility:** 80-90%  
**Slope:** 8%  
**Slope Direction:** East  
**Ground Cover:** Removed by high water  
**Survey Date:** 10 Oct 1993  
**Nearby Sites:** 14OS145, 14OS150, 14OS308, and 14OS350  
**Land Use:** Public use  
**Elevation:** 985 ft (300.2 m) amsl

### Site Description:

This site is a small lithic scatter on an eroded slope west of One Hundred and Ten Mile Creek. Surveyors noted materials on the reservoir shoreline at an elevation of 985 ft amsl. Materials were restricted to an area measuring 5 m north-south by 2 m east-west. Due to high water levels in the reservoir immediately prior to the survey, visibility at the site location was 75%. Because lithics were noted adjacent to the shoreline, it is possible that portions of the site are covered by the reservoir.

### Nearby Sites:

All of the following distances are approximate. Site 14OS145 is 800 m to the north across the creek, 14OS150 is 400 m to the southeast on the same side of the creek, 14OS308 is nearly 1.6 km to the southeast on the same side of the creek, and the two parts of 14OS350 are slightly more than 800 m and more than 1.2 km to the northwest on the same side of the creek.

### Materials Recovered:

The first of two artifacts from the site is a medial portion of a small projectile point made of white Mississippian chert. It bears evidence of an impact fracture on the tip end. The second artifact collected is a primary decortication flake. Surveyors discovered six other flakes but did not collect them.

**Existing Impacts:**

Erosion has removed upper parts of the deposit as indicated by a bench cut by wave action at the 1015 ft amsl contour.

**Potential Impacts:**

Erosion by wave action poses a major threat to this site if reservoir levels are raised above 985 ft amsl.

**Recommendations:**

This site is an extremely small scatter of surface material with limited content. Cultural and temporal placement of the site cannot be addressed because no diagnostic artifacts were noted or collected. Activities conducted at the site were probably related to stone tool manufacture. The lack of integrity of the site makes it of limited potential use to address regional research questions. Based on the lack of materials present at the site, nomination for the National Register is not recommended.

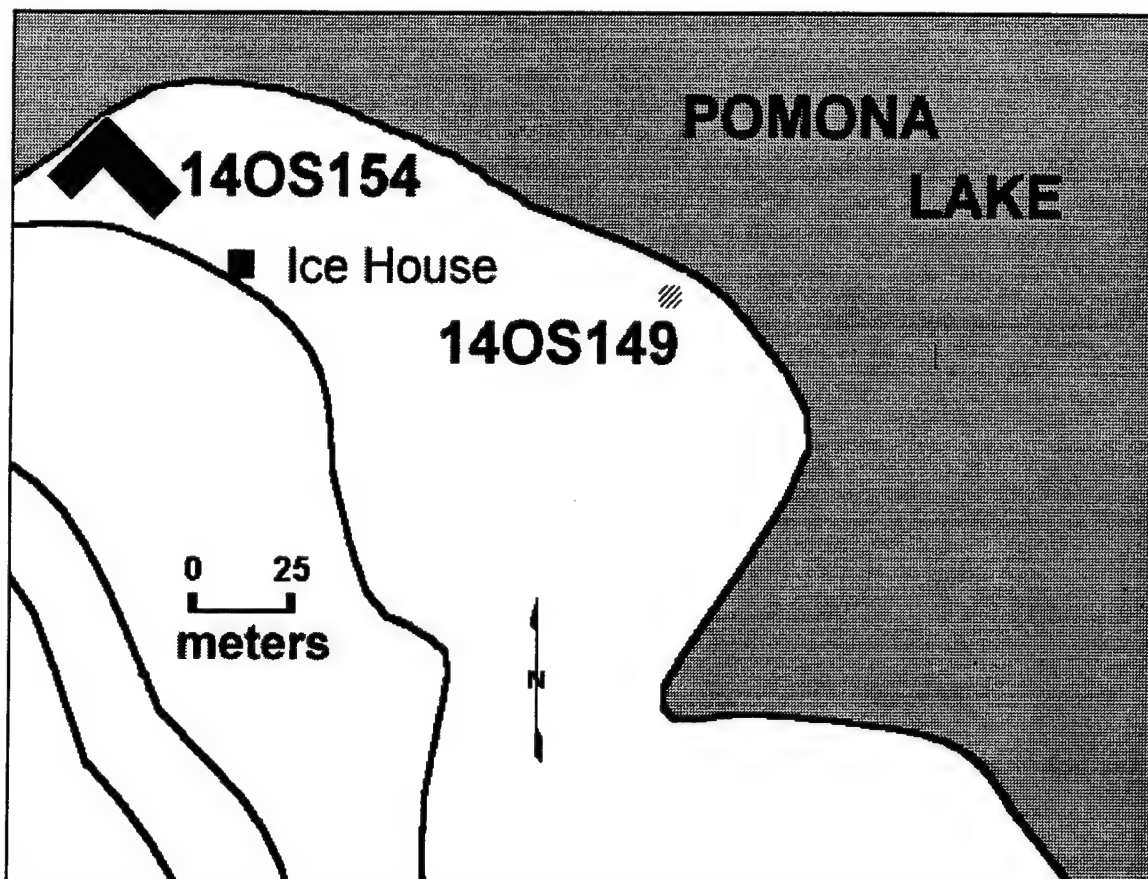


Figure 12. Map showing the location of site 14OS149.

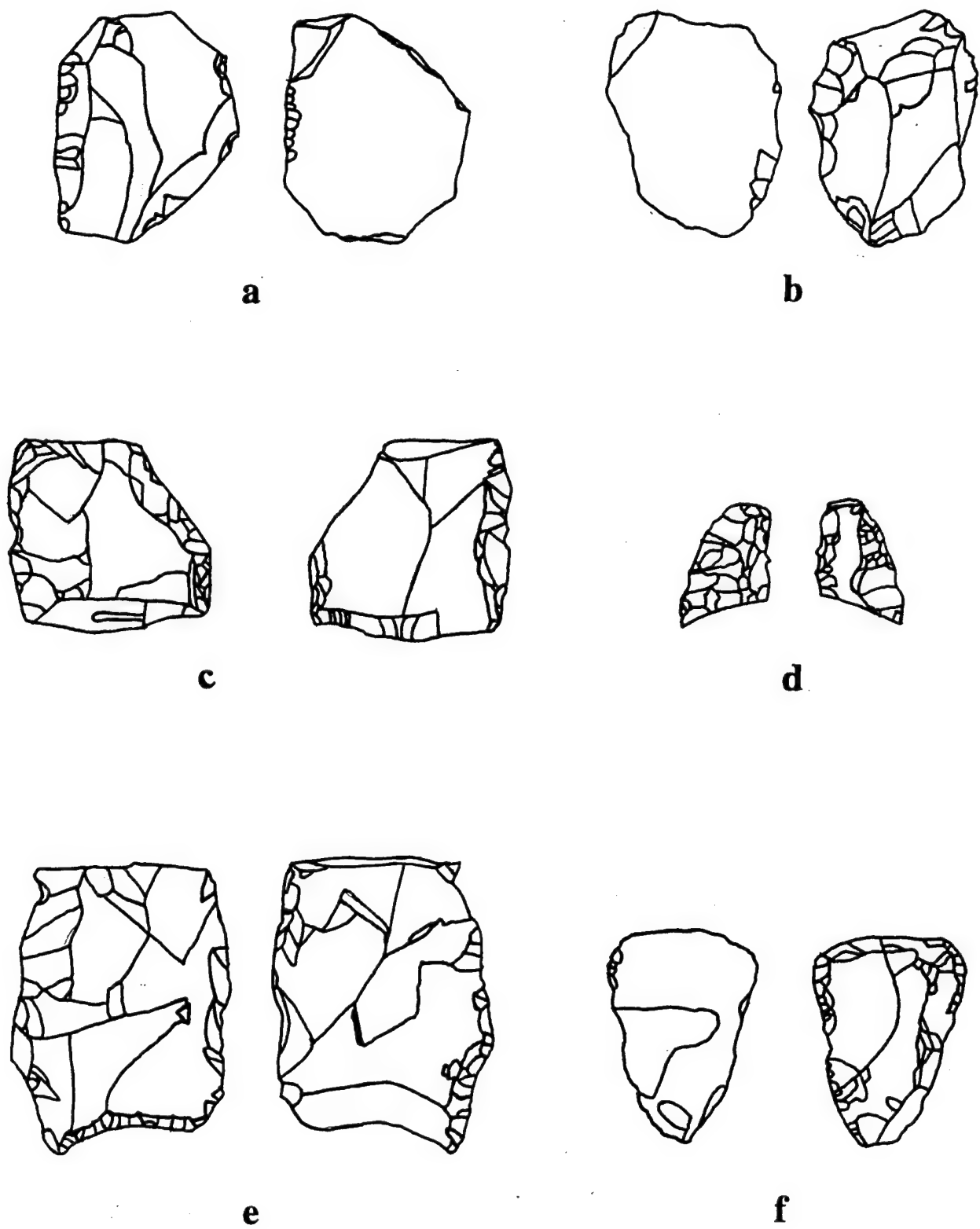


Figure 13. Chipped stone artifacts from 14OS145 (a,b), 14OS146 (f), 14OS148 (c,d) and 14OS151 (e).

## 14OS150

**Field No:** FS8

**Cultural Affiliation:** Unknown

**Topographic Setting:** Osage Cuestas

**Parent Material:** Pennsylvanian Limestone and Shale

**Type of Site:** Small lithic scatter

**Recording Agency:** University of South Dakota Archaeology Laboratory

**Drainage:** One Hundred and Ten Mile Creek

**Site Size:** 10 m north-south by 6 m east-west

**Surface Visibility:** 100%

**Slope:** 8%

**Slope Direction:** Northeast

**Ground Cover:** Removed by high water

**Survey Date:** 10 Oct 1993

**Nearby Sites:** 14OS145, 14OS149, 14OS308, and 14OS350

**Land Use:** Public use

**Elevation:** 985 ft (300.2 m) amsl

### Site Description:

This site is a small, yet dense, lithic scatter on northeast sloping land on the west side of One Hundred and Ten Mile Creek Valley. High reservoir levels at an elevation of 1015 ft amsl exposed the site, making surface visibility approximately 70%. Wave action severely eroded the site. Most of the A Horizon, at least 15-25 cm of the surface, appeared to have been removed. The examination of erosional features in the site produced no positive evidence for subsurface components.

### Nearby Sites:

All of the following distances are approximate. Site 14OS145 is nearly 1.2 km to the northwest, 14OS149 is 400 m to the northwest, 14OS308 is nearly 600 m to the southeast, and the two parts of 14OS350 are approximately 1.2 km and less than 1.6 km to the northwest.

### Materials Recovered:

Although surveyors noted 31 flakes at the site, they only recovered a representative sample of four specimens. Two flakes are yellowish brown Pennsylvanian chert. A third is a broken flake of light pinkish gray Mississippian chert. The fourth specimen collected is yellowish brown Permian chert.



**Existing Impacts:**

Erosion has already removed upper parts of the deposit as indicated by a 25 cm bench cut by wave action at the 1015 ft amsl contour.

**Potential Impacts:**

Erosion by wave action poses a major threat to this site if reservoir levels are raised above 985 ft amsl.

**Recommendations:**

This site is an extremely small lithic scatter with limited content. Cultural and temporal placement of the site cannot be addressed due to a lack of diagnostic artifacts. Activities conducted at the site probably related to stone tool manufacture. The lack of integrity of the site makes it of limited potential use for regional research questions. The site is not recommended to be eligible for National Register nomination.

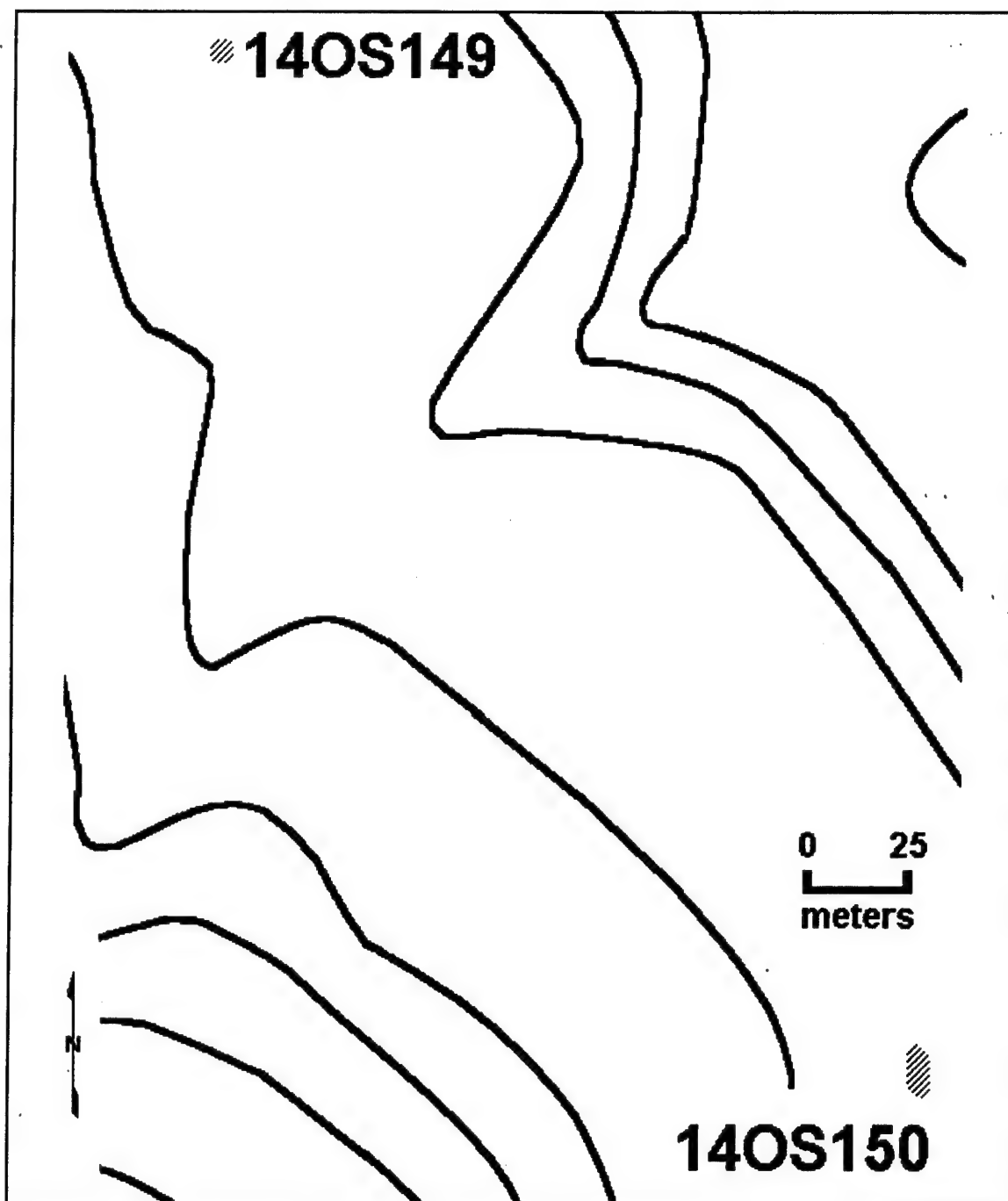


Figure 14. Map showing the location of site 14OS150

## 14OS151

**Field No:** FS9

**Cultural Affiliation:** Archaic

**Topographic Setting:** Osage Cuestas

**Parent Material:** Pennsylvanian Limestone and Shale

**Type of Site:** Extensive lithic scatter

**Recording Agency:** University of South Dakota Archaeology Laboratory

**Drainage:** Dagoon Creek

**Site Size:** 23 m north-south by 30 m east-west

**Surface Visibility:** 80%

**Slope:** 4%

**Slope Direction:** Southeast

**Ground Cover:** Cultivated field

**Survey Date:** 10 Oct 1993

**Nearby Sites:** 14OS101, 14OS104, 14OS144, and 14OS152

**Land Use:** Public use

**Elevation:** 990 ft (301.8 m) amsl

### Site Description:

Surveyors noted a lithic scatter on a terrace in a cultivated field at the northern edge of Dagoon Creek floodplain. The site is situated slightly above the juncture of Possum and Dagoon Creeks. The scatter is at the base of a southeasterly trending slope at the edge of the floodplain, 800 m north of Dagoon Creek channel. Surface visibility was limited to 80% as a result of the site's location in a cultivated field. Elevation of the site is 990 ft amsl. Collection from an area 23 m north-south by 30 m east-west consisted of flakes and a large stemmed projectile point base. The projectile point base suggests an Archaic affiliation for the site.

### Nearby Sites:

All of the following distances are approximate. Site 14OS101 is slightly more than 1.4 km to the southwest, 14OS104 is approximately 800 m to the south, 14OS144 is 1.6 km to the southeast, and 14OS152 is 800 m to the southeast. None of the nearby sites have an Archaic affiliation.

### Materials Recovered:

Surveyors recovered five artifacts from this site. The first is a stemmed projectile point base made from red fossiliferous chert (Figure 13e). The specimen shows evidence of

having been heated. The second specimen is a flake fragment of very pale orange Mississippian chert. The third object is a flake fragment of moderately red quartzite with cortex. The fourth specimen is a proximal fragment of a flake of moderate reddish orange chert which shows evidence of heating. The fifth specimen, a piece of shatter of moderately reddish orange chert, also shows evidence of heating.

#### **Existing Impacts:**

Agricultural practices pose the major threat to this site. It has been shown that agriculture caused noticeable damage to at least five previously recorded archeological sites in the project area (Traub 1978; Schmits 1988; Ziegler 1992) and five sites recorded during 1993.

#### **Potential Impacts:**

Because the site is located at the extreme western end of the lake, scouring and wave action are not a problem even if the reservoir level is raised above 990 ft amsl.

#### **Recommendations:**

Examination of the eroded edges of a road at the north limits of the site and an eroded ditch at the western limit showed no evidence of subsurface materials at the site. Since only two other sites of this time period are known from the reservoir, this site should be preserved by removal from agricultural use.

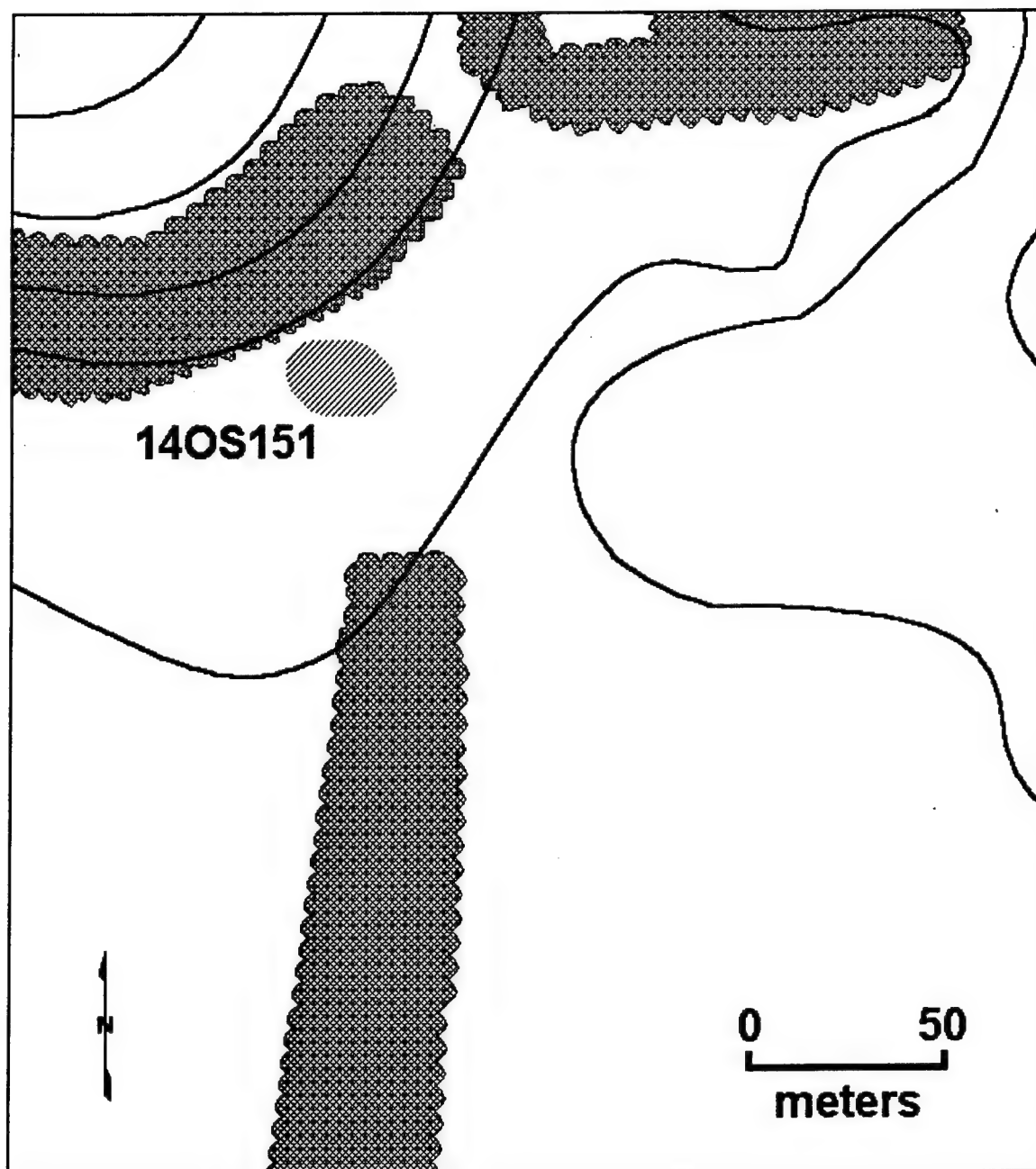


Figure 15. Map showing the location of site 14OS151

## 14OS152

**Field No:** FS10

**Cultural Affiliation:** Unknown

**Topographic Setting:** Osage Cuestas

**Parent Material:** Pennsylvanian Limestone and Shale

**Type of Site:** Small lithic scatter

**Recording Agency:** University of South Dakota Archaeology Laboratory

**Drainage:** Dragoon Creek Floodplain

**Site Size:** 5 m north-south by 10 m east-west

**Surface Visibility:** 90-100%

**Slope:** < 2%

**Slope Direction:** South

**Ground Cover:** Cultivated field

**Survey Date:** 10 Oct 1993

**Nearby Sites:** 14OS104, 14OS144, and 14OS151

**Land Use:** Public use

**Elevation:** 985 ft (300.2 m) amsl

### Site Description:

Surveyors discovered a sparse lithic scatter in a field northeast of where the Highway 75 bridge crosses Pomona Lake. The scatter is on a terrace remnant in an agricultural field at an elevation of 985 ft amsl. Vegetation at the site had been scoured by high reservoir levels and agricultural activity, making surface visibility nearly 100%. Depressions west of the site are remnants of an abandoned meander of Dragoon Creek.

### Nearby Sites:

All of the following distances are approximate. Site 14OS104 is slightly more than 400 m to the west, 14OS144 is 800 m to the south, and 14OS151 is 800 m to the northwest.

### Materials Recovered:

Flakes, shatter and a biface were noted on the surface of the site, an area measuring 5 m north-south by 10 m east-west. Surveyors only recovered the biface. It is discoidal in shape and yellowish gray in color and is made of fossiliferous Pennsylvanian chert. Cortex is visible on the surface of the specimen.

**Existing Impacts:**

Agricultural practices pose the major threat to this site. It has been shown that agriculture caused noticeable damage to at least five previously recorded archeological sites in the project area (Traub 1978; Schmits 1988; Ziegler 1992) and five others reported in 1993.

**Potential Impacts:**

Because the site is located at the extreme western end of the lake, scouring and wave action are not a problem even if the reservoir level is raised above 985 ft amsl.

**Recommendations:**

This site is an extremely small lithic scatter with limited content. Cultural and temporal placement of the site cannot be addressed because no diagnostic artifacts were noted or collected. Activities conducted at the site were probably related to stone tool manufacture. The lack of integrity of the site makes it of limited potential use to address regional research questions. Based on the lack of materials present at the site, nomination for the National Register is not recommended.

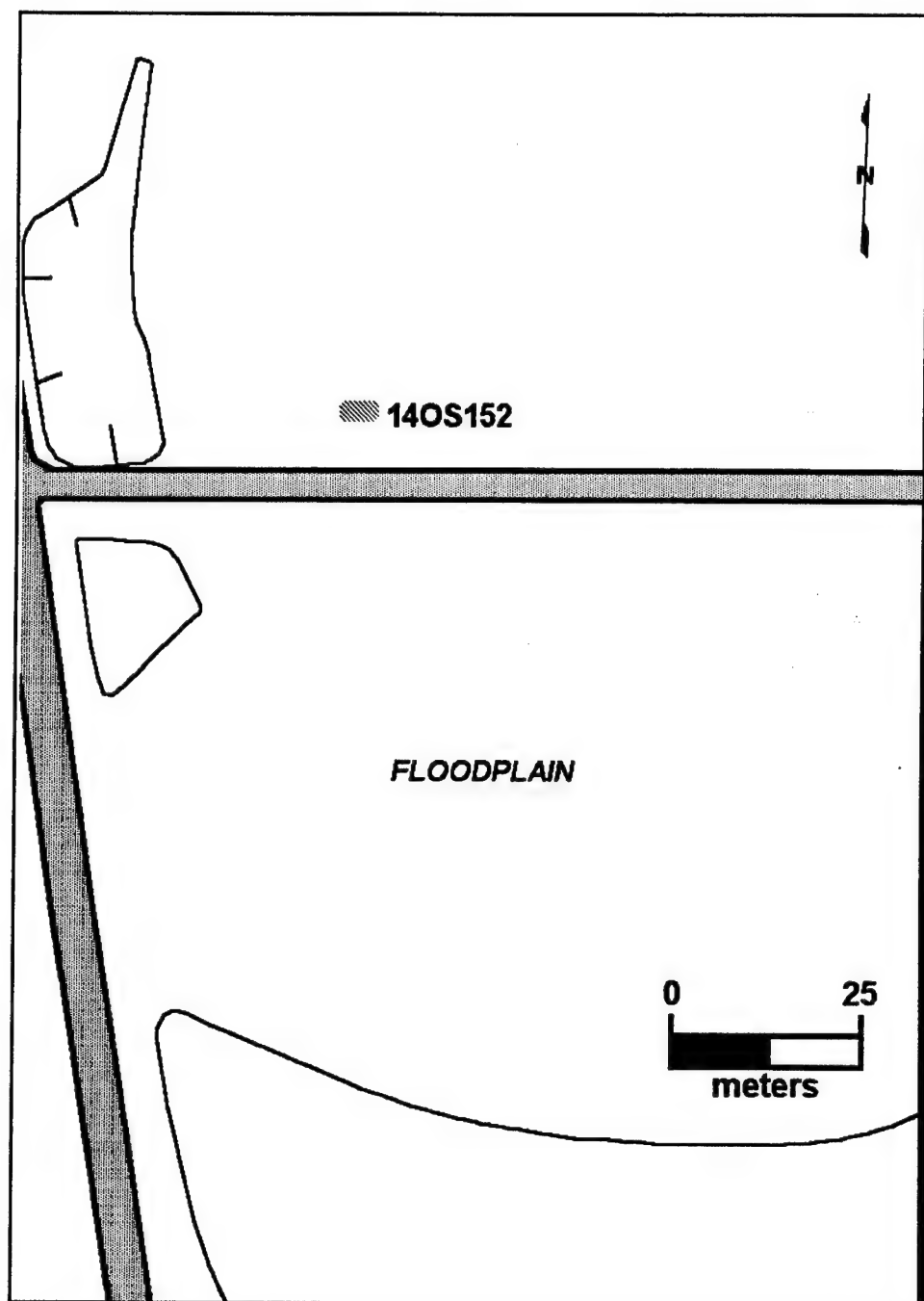


Figure 16. Map showing the location of site 14OS152



### **Euroamerican Farmsteads:**

The following four sites are structural remains of Euroamerican historical farmsteads. USD Laboratory personnel researched the records at the Kansas State Historical Society to determine the patent dates and the original occupants of each of the farms.

Settlement pattern analysis of locational behavior for prehistoric sites can yield meaningful insights into past cultural practices, but the extension of the same type of analysis to most Euroamerican settlement patterns is questionable. Euroamerican settlement patterns in the New World follow cultural features in the form of land survey types, such as long lots in the eastern U.S. or the Township/Range system west of the Mississippi, rather than following geomorphologically determined characteristics of the natural landscape (Zimolzak and Stansfield 1983:94). The Land Ordinances of 1785 and 1787 established the Township and Range pattern of land division for farmsteads. Later, the Homestead Act of 1862 enacted to minimize land speculation by subdividing farmsteads into quarter sections and established farmstead sizes. This Act produced the dispersed pattern of farmsteads still evident in rural America today. Land ownership boundaries, size of farmsteads and access to the transportation infrastructure are tied to the land survey system and play an important role in locational decisions affecting Euroamerican farmsteads west of the Mississippi. However, a limited range of locational choices would be available to Euroamerican settlers within the constraints of the survey system and the size of parcels settled. The earliest settlers prior to the development of the transportation infrastructure may have been more influenced by geomorphology than by the survey system to settle in specific places. Once the transportation network was developed, however, farmsteads would be expected to exhibit a pattern of locational behavior influenced more by access to roads than by any other variable.

The forms used to report Euroamerican sites discussed below lack some of the categories used for prehistoric sites. Because Euroamerican farmsteads exhibit a dispersed settlement plan, nearby sites are of less importance than is the case with prehistoric sites. Other attributes of place, such as slope, which may have been meaningful for locational decisions made by historic settlers are retained as categories for site descriptions.

## 14OS153

**Field No:** FS11

**Cultural Affiliation:** Euroamerican Historic

**Topographic Setting:** Osage Cuestas

**Parent Material:** Pennsylvanian Limestone and Shale

**Type of Site:** Structural Remains

**Recording Agency:** University of South Dakota Archaeology Laboratory

**Drainage:** Dagoon Creek Valley

**Structure/Foundation Size:** (partial) corner 3 m by 4 m

**Surface Visibility:** 50-80%

**Slope:** 6%

**Slope Direction:** Southeast

**Ground Cover:** Local Grasses

**Survey Date:** 4 Oct 1993

**Land Use:** Public use

**Elevation:** 990 ft (301.8 m) amsl

### **Site Description:**

Surveyors observed part of a foundation near the end of a small tributary valley which adjoins the Dagoon Creek Valley to the south. The foundation is "L" shaped with concrete footings 30.5 cm in thickness and is probably not complete. Rock fill is evident inside the angle of the "L". Size of the foundation is 4 m north-south and 3 m east-west. The immediate area surrounding the foundation is partially overgrown with local vegetation, making visibility 50 to 80%.

The Section 8 patent in which the foundation is located was issued to Chas. M. Basker on April 5, 1877. On May 28, 1877 the land was deeded to C.A. Darling who sold the parcel to William C. Haufler in 1908. The land stayed in the Haufler family until it was deeded back to the United States in 1961.

### **Materials Recovered:**

Surveyors noted rusted sheet metal fragments in the area of the foundation. None were identifiable.

### **Existing Impacts:**

None noted

**Potential Impacts:**

The site is not visible from the road or the water and is probably safe from vandalism. Erosion from wave action poses no threat to the site.

**Recommendations:**

It is unlikely that the foundation is complete and therefore the site lacks integrity. It is not recommended for the NRHP.

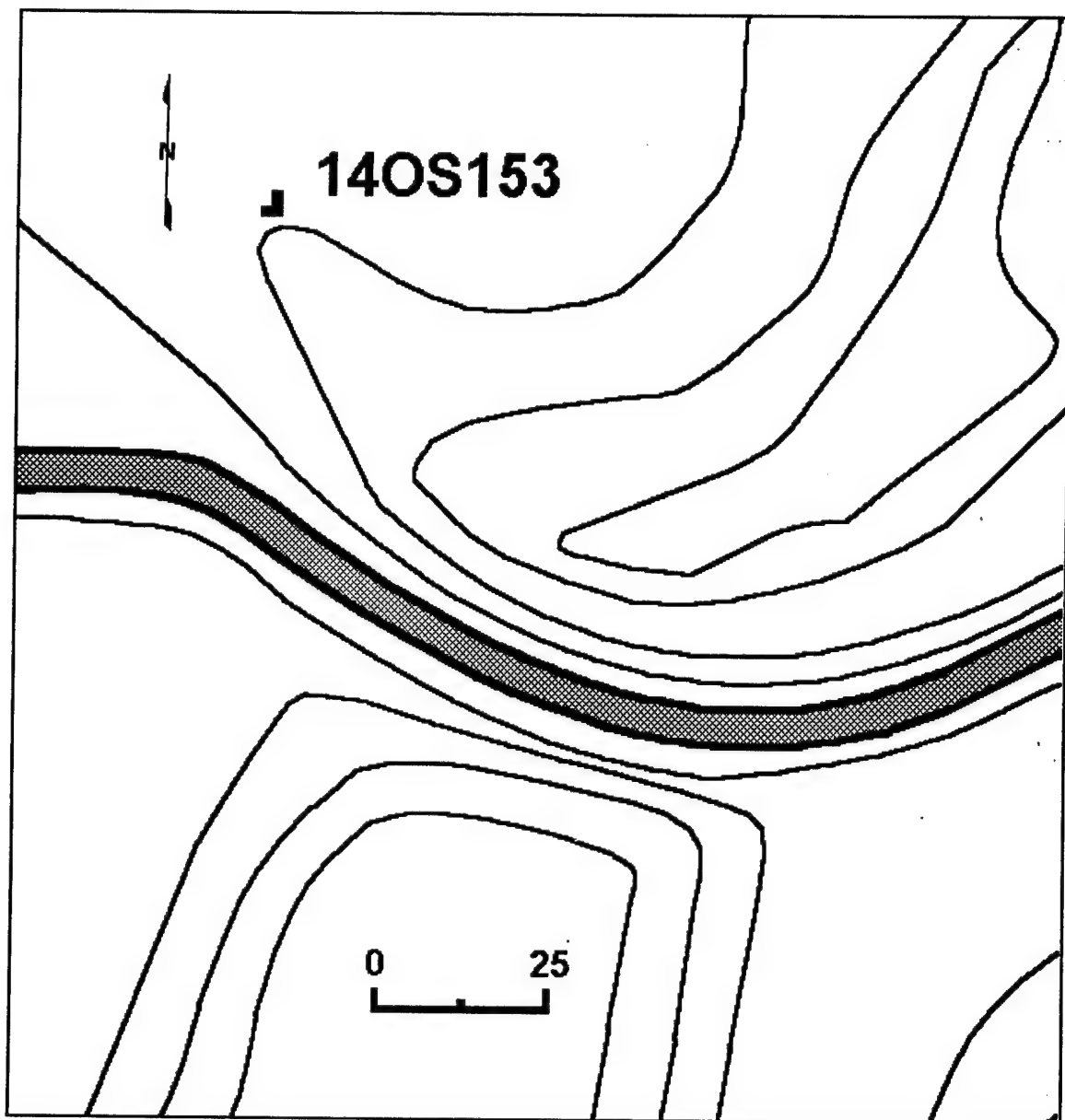


Figure 17. Map showing the location of site 14OS153

## 14OS154

**Field No:** FS12

**Cultural Affiliation:** Euroamerican Historic

**Topographic Setting:** Osage Cuestas

**Parent Material:** Pennsylvanian Limestone and Shale

**Type of Site:** Foundations

**Recording Agency:** University of South Dakota Archaeology Laboratory

**Drainage:** One Hundred and Ten Mile Creek

**Foundation Size:** 'L' shaped structure with the largest room measuring 5 m by 15 m and the adjoining room measuring 5 m by 17 m. An icehouse foundation 5 m by 2.5 m is south of the main structure.

**Surface Visibility:** 100%

**Slope:** < 2%

**Slope Direction:** Northwest

**Ground Cover:** Sparse grasses

**Survey Date:** 10 Oct 1993

**Land Use:** Public use

**Elevation:** 985 ft (300.2) amsl

### Site Description:

This site consists of remains of at least two structures. The main structure, which is "L" shaped, sits on a finger of land pointing northwest toward One Hundred and Ten Mile Creek. The foundation and lower parts of the superstructure are dry laid masonry 76 cm in thickness. Tabular blocks of limestone make up the low walls. Surviving walls measure 1 m in height above the ground. The main room of the structure is oriented southeast-northwest and measures 17 m in length by 5 m in width. The adjoining room is oriented southwest by northeast and measures 15 m in length by 5 m in width. A thick walled (ice-house?) structure measuring 5 m by 2.5 m stood to the south of the main structure and measures. A pile of cut stone different in size and texture from the building stone used at the site lies to the northwest of the structure and appears to have been scavenged from another structure and brought to the site. Nineteenth century artifacts were noted in the vicinity of the structure. A set of buggy seat springs and brass kerosene lamp parts were noted to the south of the structure. Although nineteenth century artifacts were noted in the vicinity of the structures, none were collected so future researchers might better delimit the location of other cultural features such as outhouses or other outbuildings.

The patent for Section 2 was issued to Daniel Dodge on April 20, 1872 and remained in the Dodge family until after 1906 when the deed was issued to Robert Forbes. The deed changes hands after 1917, but the Forbes family regained control of the land again in 1931. In 1952, the property was sold to Martin Masenthin who deeded the property to the United States in 1962.

**Materials Recovered:**

Surveyors collected three specimens from this site. The first is a clear glass fragment of a Ball Mason Jar. The second is a piece of ironstone crockery. A portion of the maker's mark is visible on the base. The third is a brass locking ring for the wick feed mechanism of a kerosene lamp.

**Existing Impacts:**

Because the site is located nearly at the lake edge, wave action may pose a problem.

**Potential Impacts:**

Because the stone foundation and walls are dry laid masonry, the potential for vandalism is high. Fortunately, the site is in an isolated area with limited access. The nearest road is separated from the site by heavy undergrowth. The remains are visible from the water and vandalism may pose a problem from that direction.

**Recommendations:**

The site should be tested to determine the full range of structures present and to determine the NRHP eligibility. Historical research at the Kansas State Historical Society failed to produce documentation of the structure, but further literature research may lead to this information. Once the age of the site is known, the Kansas State Plan for Preservation may be used to assist the significance of the structure. Eligibility for the National Register may then be determined.

**Research Questions for NRHP Testing at 14OS154:**

The first and foremost question to be addressed by NHRP testing is an assessment of the age of the site. Dates for the structures and occupation should range within the 90 year period between when the patent for the land was issued in 1872 and 1962 when the land sold to the government. The association between the masonry walls evident in the area and the similarly constructed structure should be clarified.

Additional problems which could assist in assessing the significance of the site for NRHP status would be defining the kinds and location of outbuildings. The two structural remains noted at the site suggest a strewn farmstead layout presumably as a response to the hazards of fire when wooden superstructures are built (Jordan *et al* 1994:279-280). Often the structure itself or the layout can also provide indicators of the ethnicity of the builder.

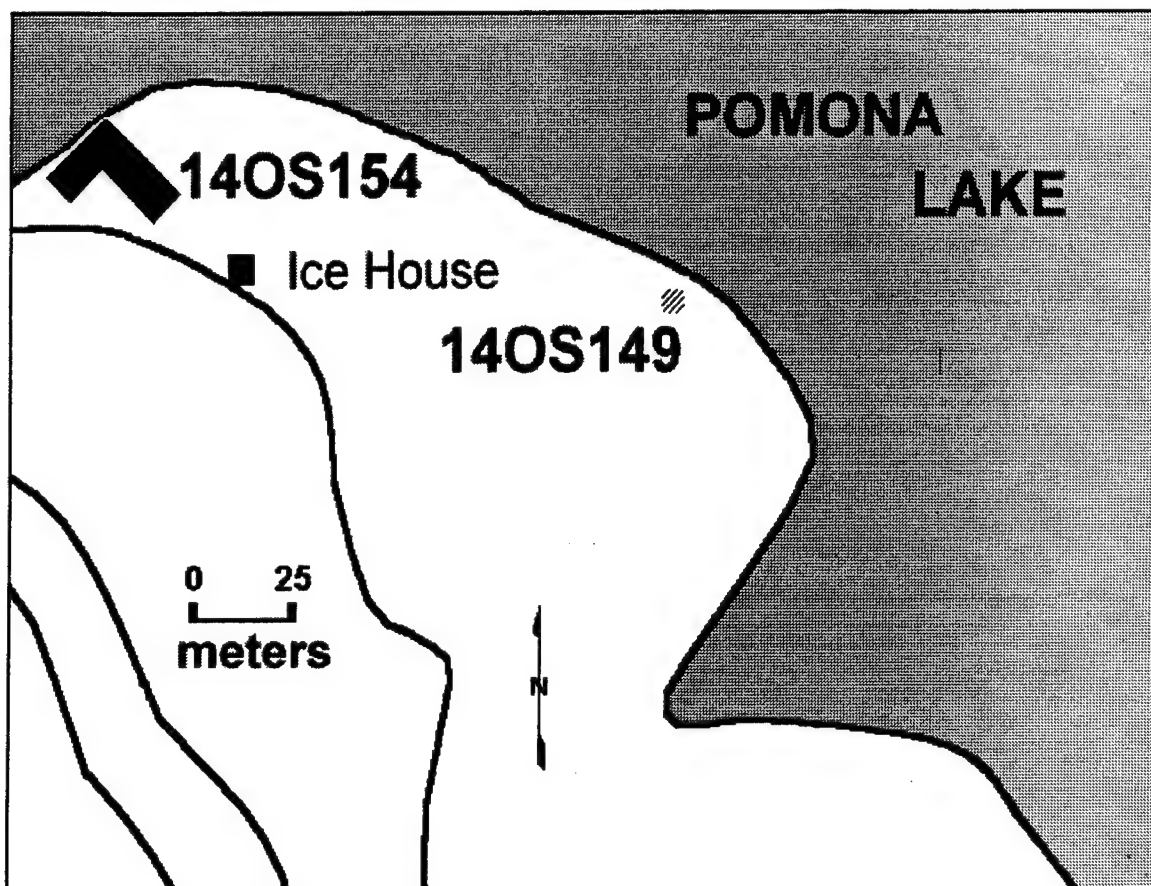


Figure 18. Map showing the location of site 14OS154.

14OS155

**Field No:** FS13

**Cultural Affiliation:** Sac and Fox

**Topographic Setting:** Osage Cuestas

**Parent Material:** Pennsylvanian Limestone and Shale

**Type of Site:** Mound

**Recording Agency:** University of South Dakota Archaeology Laboratory

**Drainage:** Dragoon Creek Valley

**Site Size:** 22 m by 10 m

**Surface Visibility:** 60-75%

**Slope:** 8%

**Slope Direction:** North

**Ground Cover:** Indigenous grasses and heavy trees

**Survey Date:** 12 Oct 1993

**Land Use:** Public use

**Elevation:** 999 ft (304.5 m) amsl

**Site Description:**

14OS155 is a possible Sac and Fox burial and a nearby mound. This site sits in a heavily wooded area with a large growth of indigenous grasses. The mound is 3.5 m north-south by 4.6 m east-west. Two white crockery fragments found nearby indicate a post-settlement origin. The possible burial is an arrangement of tabular blocks of limestone which is located 23 m northwest of the mound. It is comprised of a rectangular arrangement of tabular limestone slabs arranged around an open space large enough for an extended burial. The stone arrangement measures 2.6 m in length and 1.5 m in width. Wilmeth (1958:8-9) reports several somewhat smaller Sac and Fox graves at 14OS301 which measured 5.5 ft by 3 ft and 5 ft by 4 ft (1.7 m by .91 m and 1.5 m by 1.2 m).

A patent was issued for this tract on April 20, 1872 to Edward W. Neill whose family retained the eastern half until it was acquired by the Federal government in 1962. The Forbes family acquired the western half of the original parcel and also retained it until it was sold to the government in 1962.

The probable human remains at this site must be evaluated in terms of NAGPRA, "Native American Grave and Repatriation Act of 1990" (P.L. 101-601). The possible Sac and Fox burials presents a problem. To determine if burials are indeed present requires testing or disturbance to ascertain if the site warrants protection from disturbance. Because NAGPRA requires a justification for removal of human remains, it may be possible to determine NRHP status by only exposing enough material to allow determination of site content.



**Existing Impacts:**

The site is next to a road with restricted access; a locked gate blocks the road 50 m south of the site. Since the area is wooded and brushy, there is little likelihood of vandalism or disturbance.

**Potential Impacts:**

Because the site is located near a service road, widening the road or altering its route may pose a problem.

**Recommendations:**

Avoidance of the site as a possible burial site is recommended.

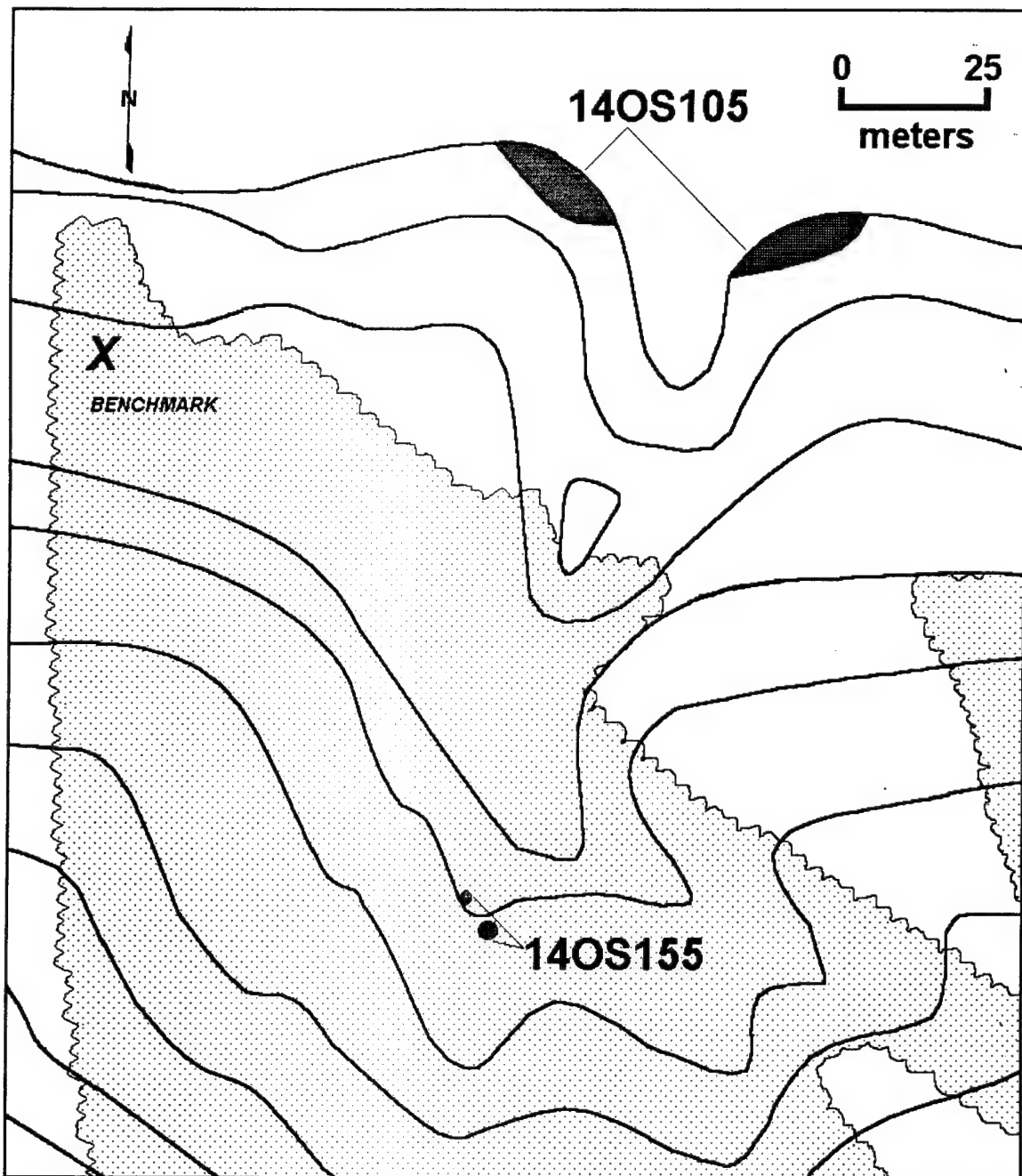


Figure 19. Map showing the location of site 14OS155

## 14OS156

**Field No:** FS14

**Cultural Affiliation:** Euroamerican Historic

**Topographic Setting:** Osage Cuestas

**Parent Material:** Pennsylvanian Limestone and Shale

**Type of Site :** Foundations

**Recording Agency:** University of South Dakota Archaeology Laboratory

**Drainage:** Dragoon Creek

**Structure Size:** 32 m north-south by 28 m east-west

**Surface Visibility:** 40-65%

**Slope:** 8%

**Slope Direction:** Northeast

**Ground Cover:** Grasses

**Survey Date:** 10 Oct 1993

**Land Use:** Public use

**Elevation:** 995 ft (303.2 m) amsl

### Site Description:

This site consists of two structural remains (foundations). These two foundations are at the bottom of a northeasterly trending slope south of Dragoon Creek. The most southerly foundation is a large rectangular house foundation or platform; the other is circular. The platform is made of masonry and stones and measures 160 cm high, 32 m north-south and 28 m east-west. At the northwest end of the platform a concrete slab which measures 8.5 m north-south by 7 m east-west probably served as a floor for a garage. 400 m to the north is a recent foundation for a circular grain bin and several piles of building stone probably salvaged from a building which was torn down. Both foundation areas have a north-south dirt road connecting them. Soil type is Summit silty clay loam for the southern area and Lebo-Rock outcrop complex for the northern. Both areas were heavily overgrown with dense vegetation making visibility 40-65%. Surveyors noted recent historical debris in the road in the southern part of the site but collected no material.

A patent on Section 7 was issued to Wm. R. Segers in 1870 who deeded it out in three parcels on April 10 of the next year. The land changed hands in 1880, 1922, and 1945. The last owner prior to acquisition by the United States in 1961 was W.C. Neihart.

### Potential Impacts:

A dirt road provides easy access to the site, making vandalism a potential impact. Because mortar secures most of the platform stones and there are no standing structures, this threat is minimal.

**Recommendations:**

The concrete garage floor adjacent to the platform suggests a date for the structure which post dates the introduction of the automobile. According the KPP, this would place the earliest date for the structure in the 'Time of Contrast' which dates between 1900 and 1939. The site is not recommended for the NRHP.

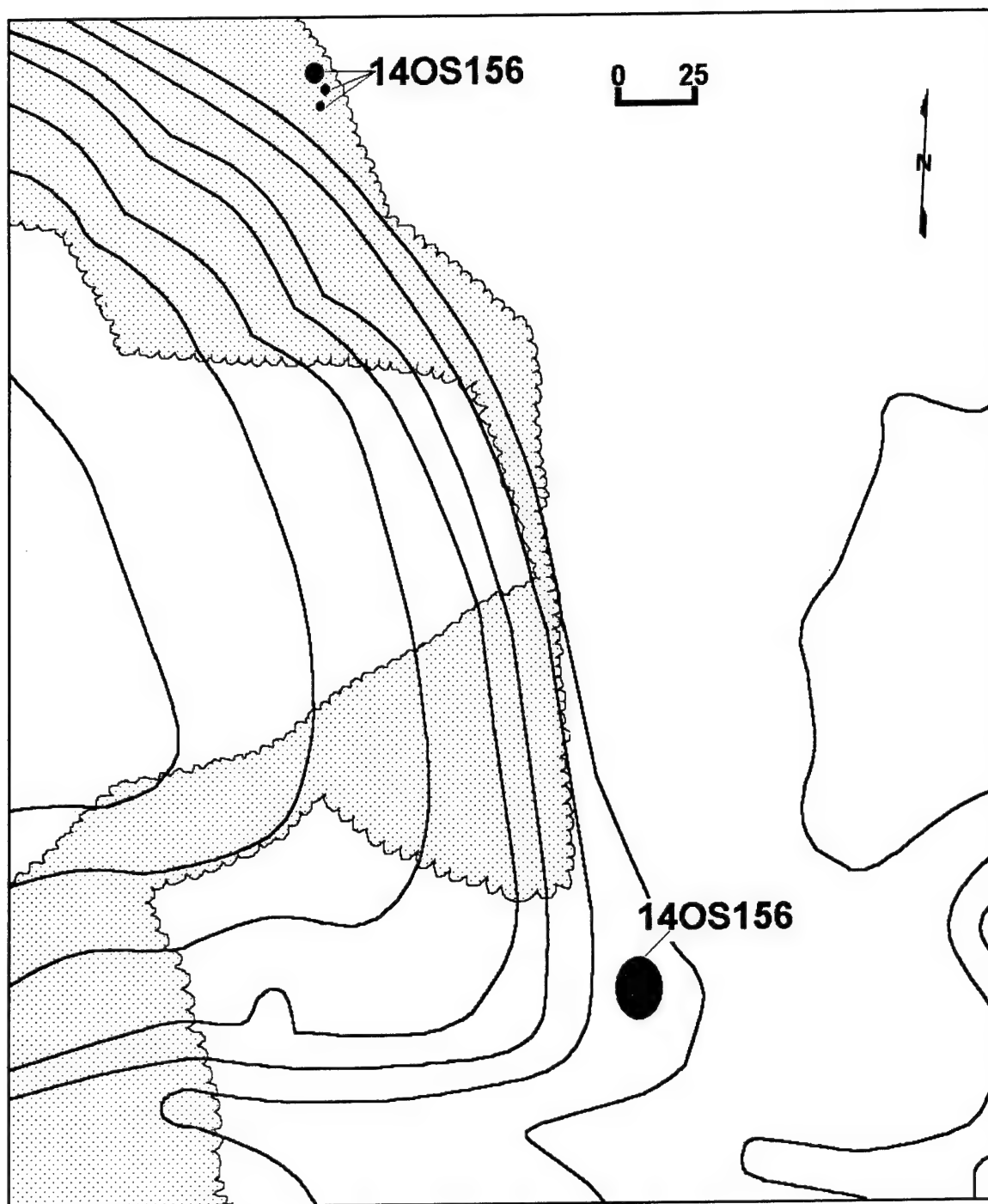


Figure 20. Map showing the location of site 14OS156

### **PREVIOUSLY RECORDED SITES REVISITED IN 1993**

Previously recorded sites within the bounds of the 1993 project area were revisited when possible to determine their current condition and content. Most of the sites reported by Wilmeth in 1958 and by Schmits in 1984 are now inundated. Only four of the 26 previously recorded sites are in the 1993 project area (above the 986.4 ft contour interval and the Corps boundaries). Surface materials were noted only at 14OS102, 14OS103 and 14OS342. Site 14OS321 had been destroyed by the construction of the Management Park overlooking the dam site. Shovel testing in the area revealed no trace of the site. Another site, 14OS329, is 1.6 km south of the reservoir and lies outside the project area.

## 14OS102

**Site Number:** 14OS102

**Type of Site:** Large lithic scatter

**Cultural Affiliation:** Pomona?

**Topographic Setting:** Osage Cuestas

**Parent Material:** Pennsylvanian Limestone and Shale

**Drainage:** Near the juncture of Coyote and Dragoon Creeks

**Recording Agency:** Environmental Systems Analysis, Inc.

**Site Size:** 12,000 sq m

**Surface Visibility:** 50-60%

**Ground Cover:** Cultivated field

**Survey Date:** 1982

**Land Use:** Agricultural

**Elevation:** 980 ft (298.7 m) amsl

### **Site Condition:**

This site occupies a position on a T-1 terrace adjacent to Dragoon Creek. Schmits (1988:248) reports a collection from the site which includes a Pomona Ware sherd and small, triangular projectile points. Flakes were noted in the vicinity of the site in 1993. No diagnostic materials were noted or collected. Because a collection of materials from the site exists, no additional non-diagnostic materials were collected. Shovel testing yielded no subsurface materials at the location.

### **Existing Impacts:**

The site is threatened by erosion caused by agricultural activities.

### **Recommendations:**

The site should be removed from cultivation to protect what remains of the site.

## 14OS103

**Site Number:** 14OS103

**Type of Site:** Light lithic and ceramic scatter

**Cultural Affiliation:** Plains Village

**Topographic Setting:** Osage Cuestas

**Parent Material:** Pennsylvanian Limestone and Shale

**Drainage:** Dragoon Creek

**Recording Agency:** Environmental Systems Analysis, Inc.

**Site Size:** 8000 sq m

**Surface Visibility:** 50-60%

**Ground Cover:** Brush and grass cover.

**Survey Date:** 1982

**Land Use:** Agriculture

**Elevation:** 980 ft (298.7 m) amsl

### **Site Condition:**

This site is partially in a cultivated field at the extreme western end of the reservoir. Schmits (1988:248) reports a collection from the site which includes a Pomona Ware sherd and small, triangular projectile points. Flakes were noted in the vicinity of the site in 1993. Because a collection of materials from the site already exists, no additional materials were collected. Linear erosional features 30 cm deep at the site showed no evidence of subsurface deposits.

### **Existing Impacts:**

Erosion as a result of cultivation threatens the site. The shallow eroded ditches noted at the site are a result of agricultural activities.

### **Recommendations:**

The site should be removed from cultivation to protect what remains of the site.



## 14OS342

**Site Number:** 14OS342  
**Type of Site:** Small Lithic scatter  
**Cultural Affiliation:** Plains Woodland  
**Topographic Setting:** Osage Cuestas  
**Parent Material:** Pennsylvanian Limestone and Shale  
**Drainage:** Dragoon Creek (Main body of the reservoir)  
**Recording Agency:** KSHS  
**Site Size:** 400 sq m  
**Surface Visibility:** 50-60%  
**Ground Cover:** Sparse grasses  
**Survey Date:** 12/12/73  
**Land Use:** Vassar State Park - Public use  
**Elevation:** 1010 ft (307.8 m) amsl

### Site Condition:

Traub (1978) reports extensive damage to the site by campers and erosion. During the 1993 survey, the site was once again examined. Only a single flake was noted on the surface near the center of the area identified by Traub. The object was not removed. An 80 cm by 80 cm nearly square hole had been placed near one of the roads for unknown purposes. The profile of the pit showed no evidence of subsurface materials, and it is possible that the site has been destroyed by erosion and campers over the past three decades. Because only a biface fragment and a flake were collected in 1972 and 'only some chips' were noted (KSHS site files), the site lacks content to warrant further investigations. Shovel tests placed near the center of the reported site produced no evidence of subsurface cultural remains.

### Recommendations:

Although investigated since 1972, this site has never produced materials to warrant further investigations. The site has limited content. Cultural and temporal placement of the site cannot be addressed because no diagnostic artifacts were noted or collected. However, based on limited surface collections, Witty (KSHS site form) suggests that the site may be Plains Woodland. The lack of integrity of the site makes it of limited potential use to address regional research questions. The determination of not eligible for National Register nomination (Ziegler 1992:10) is further supported by the 1993 investigations.

## Chapter 6: CONCLUSIONS

### SUMMARY OF RECOMMENDATIONS:

Of the 14 sites recorded in 1993 (Table 4), two are recommended for further testing to determine NRHP status, three sites should be removed from agricultural use, eight lack content or integrity for inclusion in the NRHP and one contains probable human remains and must be evaluated in terms of NAGPRA, "Native American Grave and Repatriation Act of 1990" (P.L. 101-601). Two sites identified during earlier surveys of the reservoir area are also recommended for removal from agricultural activity.

Site 14OS145, a Woodland and Central Plains occupation, is recommended for further testing to determine NRHP status (Figure 4). Ceramics and projectile point styles indicate Pomona and Plains Woodland components at 14OS145. Although preservation is the preferred option for 14OS145, three factors necessitate NRHP testing there. The site straddles a road in a high use area where wave action exposes materials along the shoreline. Limited testing at the site during 1993 demonstrated that some subsurface cultural materials are present there. The intensity of occupation at the site is greater than any other site recorded in 1993, suggesting that a greater range of activities may have taken place there.

A second site recommended for NRHP testing is a EuroAmerican homestead, 14OS154. NRHP testing is warranted to establish its date and duration of occupation. Structural evidence present at the site bears a resemblance to stone walls in the area which date to the 1860s or 1870s.

In addition to the abovementioned NRHP testing, this report also recommends preservation of five prehistoric sites located in agricultural fields by removing them from cultivation. Three of the sites recorded in 1993, 14OS146, 14OS148, and 14OS151, and two previously recorded sites, 14OS102 and 14OS103, warrant removal from the threat of potential destruction or damage by agricultural use. A stemmed projectile point from 14OS151 suggests an Archaic affiliation for that site; cultural affiliations for the other two sites recorded in 1993 are unknown since neither produced diagnostic artifacts. Schmits (1988:307) identifies 14OS102 as a Plains Village occupation and 14OS103 as 'unknown' cultural affiliation. As mentioned in the research design for this project, the preferred option is preservation (Wendorf 1978, King 1975, Lipe 1974). In each of the five cases mentioned above, this option is feasible.

Four prehistoric sites (14OS143, 14OS147, 14OS149 and 14OS152) lack integrity or content for eligibility to the NRHP. Each is a small lithic scatter defined in areas scoured and eroded by high reservoir levels. Another prehistoric site, 14OS144, has been disturbed by construction activities. Two Euroamerican historical sites, 14OS153 and 14OS156,

either lack integrity or are too recent for NRHP status. The possible Sac and Fox burial site, 14OS155, presents a problem. To determine if burials are indeed present requires testing or disturbance to ascertain if the site warrants protection from disturbance. Because NAGPRA requires a justification for removal of human remains, it may be possible to determine NRHP status by only exposing enough material to allow determination of site content.

### **Evaluation of Research Questions for the 1993 Survey:**

Goals defined in the research design for this project are threefold. First is the refinement of the cultural history of the area. The second and third research objectives of the study address the questions of settlement patterns and cultural process. The 1993 investigations produced limited information to address culture historical questions. Diagnostic artifacts were collected at only two of the ten prehistoric sites. As mentioned in an earlier section of this report, the establishment of a firm culture history for the region is necessary before addressing questions dealing with settlement patterns or cultural process. However, some general statements can be made concerning the culture history of prehistoric periods in light of the 1993 data.

#### **PaleoIndian:**

Investigators have not identified any site from this period in the reservoir area.

#### **Archaic Period:**

The single Archaic site recorded in the project in 1993 area cannot be assigned to a specific cultural phase at this time. However, the location of the site on a T-1 terrace does increase confidence in Schmits' prediction of Archaic materials appearing in those areas where Osage soils occur. Surveyors did not encounter any other sites situated in soils mapped as Osage complex.

#### **Woodland Period:**

The 1993 survey identified only a single Plains Woodland component at site 14OS145. Ceramics and lithics characteristic of the Plains Woodland period were collected at the site intermixed with Plains Village artifacts. Materials from the site are too limited to link the component to a particular Plains Woodland phase, although a suggestion of zoning on a single small sherd is similar to that of Hopewellian ceramics from the eastern part of the state. Schmits places only one of the other seven Plains Woodland components at the reservoir in a particular cultural phase. He identifies site 14OS104 as Greenwood phase.

#### **Plains Village:**

Ceramics and lithics identified at 14OS145 indicate a Pomona component at that site. Of the twelve other Plains Village sites recorded in the reservoir, eight are identified specifically as Pomona. None of the Pomona sites in the project area produced artifacts which would allow assignation to more specific taxa such as those defined by Brown (1984) or Johnson (1968).

### **Protohistoric Period:**

Investigators have not identified any site from this period in the reservoir area.

### **Historic Period:**

The 1993 survey identified only a single possible Sac and Fox site in the project area. Previous investigations in the reservoir area identified four such sites from the brief occupation of the area between 1840 and 1868. Four of the five Sac and Fox sites are burials, the fifth is a habitation.

A series of dry-laid limestone walls represent the earliest Euroamerican materials present in the reservoir area. Traub (1978) dates the walls to the 1860s or 1870s. Since the walls were deemed not significant, no site numbers have been assigned to features. Evidence from one Euroamerican structure, 14OS154, may provide a link between the walls and a homestead. The foundation walls of the homestead structures are of the same material and constructed in the same manner as the walls. It is possible therefore that the structural remains at 14OS154 date to the same period of construction as the walls. Although not as early, five other Euroamerican sites in the reservoir area date from the end of the nineteenth to the early twentieth century.

### **Settlement Patterns:**

Schmits (1988) based a predictive model of settlement analysis for Pomona Lake on the systematic identification of terrain types and their correlation with archeological site locations. The terrain/site model, developed from 1958, 1982 and 1984 site locations; attempted to predict terrain-based locational characteristics of sites and to extend these predictions into unsurveyed portions of the reservoir. Predictions of the model involved both densities and frequencies of sites in upland and lowland settings. The 1993 survey of the terraces, slopes and uplands of the previously unsurveyed lands provided an empirical test of Schmits' predictions (Table 5).

Schmits' discussion of his generalized terrain/site model examines the relationship between soils and settlement. The model predicts that cultural resources in unsurveyed lands will occur 'primarily on the lowlands and to a lesser degree, on the slopes of Dragoon and One Hundred and Ten Mile Creeks.' Archaic sites are expected to be on both lowlands and on slopes. Plains Woodlands occupations are expected to be located on the lowlands and 'minimally on the uplands.' Plains Village occupations can be identified in the lowlands with some evidence on the slopes and uplands. Historic Euroamerican sites should be located on the slopes and uplands (Schmits 1988:337).

In much of his discussion, Schmits (1988:336-37) predicts site location in terms of two categories, upland and lowland, which themselves reflect other variables such as soils. In other parts of his discussion, he includes slopes as a third terrain type. Based on the frequency of occurrence of sites in upland and lowland zones (Table 6) he makes predictions about the numbers of sites to be expected in each zone in the unsurveyed lands.

Assignment of sites recorded in 1993 to topographic zones followed Schmits' use of soils

as indicators of terrain types (Table 7). A table of observed and expected frequencies for the 1993 data is presented along with Schmits' in Table 8 with the predicted site densities given as sites per section, shaded. The first shaded column represents ten sites used by Schmits for his predictive model, the second represents the predictions based on the 14 sites recorded in 1993 and the third shows Schmits' ten sites with the 14 sites recorded in 1993.

This study compares 14 sites recorded in 1993 to test Schmits' predictions. The expected pattern of higher site density in the uplands compared to lowlands fails to appear. In fact, the opposite is true. Surveyors found more sites per acre in the lowlands during 1993 than in the uplands. Site densities in 1993 show that only half as many sites occur per section in the uplands as occur in the lowlands (see Table 8). The distribution of frequencies of sites in each of the two zones differs markedly from the distribution of densities in each. As with Schmits' sample, most sites recorded in 1993 occur in uplands settings.

When Schmits' data (1988:336) from 1982 and 1984 are combined with those from 1993, the density pattern produced is quite different from that predicted. This should be expected because the 1993 project area included much of the uplands of the reservoir area. Although site frequencies for the total sample follow the pattern suggested by Schmits of fewer lowland sites, site densities for the two areas are nearly equal. Eighteen sites occur in the upland locations and only six in the lowlands. Site densities for the two zones, however, are nearly equal, with 2.61 sites per section observed in the lowlands and 2.29 sites per acre observed in the uplands.

Results of the 1993 survey of the reservoir area negate some predictions made by Schmits. Site frequency distribution follows the pattern predicted by Schmits: more sites appear in upland settings. Site densities in each area are nearly equal, suggesting that Schmits' model is in need of refinement.

A probable flaw that must be addressed is that Schmits' model considers only a single variable, terrain. Prehistoric peoples considered a range of variables when making locational decisions. These locational decisions reflect the resource base, level of technology and many other features of the prehistoric group. In addition, the needs of hunter-gatherer groups are expected to differ in many ways from those of agrarian peoples. Schmits' intent as expressed by his terrain/site model may be operationalized, however, as a part of a much larger model based on an integrated set of variables associated with terrain.

Table 4. Sites Identified at Pomona Lake in 1993.

Site Number	Cultural Affiliation	Level of Investigation	Potential/ Existing Impacts	Recommendation
14OS143	Unknown	Survey	In Danger from High Water and Vandalism	No Further Investigation
14OS144	Unknown	Survey	Already Disturbed; Public Use	No Further Investigation
14OS145	Plains Woodland/ Plains Village (Pomona Focus)	Survey	Wave Action Public Use Road Maint-Vandalism.	NRHP Testing
14OS146	Unknown	Survey	Agriculture-Wave Action	Removal from Agriculture
14OS147	Unknown	Survey	Agriculture-Wave Action	No further Investigation
14OS148	Unknown	Survey	Agriculture-Wave Action	Removal from Agriculture
14OS149	Unknown	Survey	Wave Action	No Further Investigation
14OS150	Unknown	Survey	Wave Action	No Further Investigation
14OS151	Archaic	Survey	Agriculture-Wave Action	Removal from Agriculture
14OS152	Unknown	Survey	Agriculture-Wave Action	No Further Investigation
14OS153	Historic Euroamerican	Survey	None	No Further Investigation
14OS154	Historic Euroamerican	Survey	Wave Action-Vandalism	NRHP Testing
14OS155	Historic Sac/Fox	Survey	Vandalism	Burial? Should be Avoided
14OS156	Historic Euroamerican	Survey	Vandalism	No Further Investigation

Dissatisfaction with the lack of robustness in Schmits' single variable terrain/site model led the author to seek a method to evaluate complex sets of terrain variables. A Geographic Information System (GIS) (Kvamme 1986) provides the most efficient means for examining and refining models of site location and provides a way to integrate various kinds of spatial information. The author examined the feasibility of using a Geographic Information System to examine multiple factors associated with site location at Pomona Lake. A Geographic Information System is an information system designed to function with data derived from spatial or geographic coordinates. A GIS provides both a spatially derived database and a set of tools for working with the data. Map layers may be created to represent elevations, degree of slope, soils, distance to water and other variables that may then be combined, compared or manipulated singly or in unison. Descriptive statistical data, such as land use categories or slope gradients, can be extracted from the maps and graphed. The system also lends itself well to resource management and planning (Star and Estes 1990). GIS applications by Kvamme (1986) have shown the applicability of the technique to CRM projects.

### **GIS and Site Locations:**

The presentation of a complete GIS based study of the sites at Pomona Lake is not within the scope of this report. However, a more limited application using a subset of locational variables may have relevance to future settlement pattern studies in the project area.

As a first step, the authors downloaded a series of USGS Digital Elevation (DEM) map data for Eastern Kansas in 1:250,000 format. The map was trimmed to include only Pomona Lake and its immediate surroundings using MICRODEM and IDRISI GIS software. A topographic plot of the area (Figure 21) shows the terrain around Pomona Lake. This map was further reduced to include only Pomona Lake (Figure 22) and shows an elevation model of the reservoir terrain as it would appear from a viewing height of 45 degrees from the southwest. Note that the map does not show the Pomona Lake dam so as to better represent the valley in prehistory. Corps of Engineers boundaries are also omitted from this data set to allow for the inclusion of more upland terrain and surrounding landscape features in the entire watershed.

Slope gradient serves as an element of the locational model presented above in that floodplains and terraces in the lowlands are occupied by different temporal groups. Archaic peoples occupied T-1 terraces and Plains Village or Plains Woodland peoples occupied the later T-0 terraces. Schmits' model of prehistoric locational behavior attempts to predict the locations of sites belonging to different temporal groups in terms of the relative differences in their occurrence in the uplands and lowlands. However, a larger set of variables which can be measured more precisely than Schmits' terrain types may be useful to define differences between Archaic and Woodland or Plains Village. Judging by the evidence Plains Woodland and Plains Village peoples were indifferent to terrain type (lowland and upland); this may be explained as preferences in terms of separate variables such as slope gradient or aspect. An overlay of Plains Village site locations superimposed

over a map of slope gradients shows that all sites either occupy level ground or slopes with a gradient of less than 6% (Figure 23). This map shows differences in classes of slope gradient indicating that the steepest slopes were either uninhabited or were more severely eroded than less acute slopes adjacent to the valley floor. Slopes greater than six percent appear only in localized areas of the drainage and are fewer in number than lesser ones.

The aspect or facing direction of a slope can provide a measure of the availability of sunlight at a specific location. This is potentially important because season of occupation might be related to the aspect of a particular location: areas providing more sunlight may have been more desirable in cooler months while during the hotter months, locations with less exposure to direct sunlight may have been selected.

Both slope gradient and aspect can be derived from a matrix of elevations; different classes of terrain can then be mathematically segregated and a map produced showing classes of slope steepness or direction of slope. An overlay of site locations placed over the map of terrain slope will produce a visual estimate of locational preference.

Slope direction was grouped into two categories according to south facing or level terrain and those slopes which face a more northerly direction. As may be noted in Figure 24, the northern side of Dragoon Creek valley is characterized by southwest, south, and southeastern exposure. In contrast, the southern side of the valley faces northwest, north, and east. An overlay of Plains Village site locations shows that prehistoric peoples occupied the south edge of Dragoon Creek valley as well as the floodplain and terraces. Sites along the other two watercourses show a pattern of occupation on east and west edges of the valleys. Chronological placement of the sites in the project area does not allow for definition of temporal differences in site location with reference to these two variables. It is possible, however, that further research in the area will produce materials to indicate whether the differences in site aspect reflect seasonal preferences, such as south-facing slopes preferred in winter and north facing slopes in summer.

Given the proximity of the Melvern and Pomona Lakes and their availability as map data, it should be possible to include both reservoirs in a single study and to investigate settlement patterns in each. Soil maps developed by Schmits (1988) may be digitized and included in a set of complex variables to investigate site location in Eastern Kansas.

The predictions of the terrain/site model discussed by Schmits, although not in agreement with the authors' findings, represents a solid beginning for further studies. By examining soils and landforms and relating them to past locational behavior, Schmits has laid the necessary groundwork on which more detailed studies of soils, landforms, vegetation, and other variables may be examined. Geographic Information Systems may prove to be one mechanism to integrate these diverse spatial data.



Table 5. Cultural Components for the 40 Recorded Sites at Pomona Lake\*.

	Previously Recorded KSHS			Previously Recorded Schmits			Total			Recorded in 1993		
	Number	Percent		Number	Percent		Number	Percent		Number	Percent	Total
Plains Archaic	1	5.88		1	8.33		2	6.90		1	6.67	3
Plains Woodland	3	17.65		1	8.33		4	13.79		1	6.67	5
Plains Village	5	29.41		4	33.33		9	31.03		1	6.67	10
Historical Aboriginal	4	23.53		0	0.00		4	13.79		1	6.67	5
Historic Euro- American	1	5.88		2	16.67		3	10.34		3	20.00	6
Unknown Prehistoric Affiliation	3	17.65		4	33.33		7	24.14		8	53.33	15
Total	17	100.00		12	100.00		29	100.00		15	100.00	44

\* Note that 4 of the 40 sites recorded in the project area are multi component, hence a total of 44 components are shown in this table.

Table 6. Distribution of Archaeological Components at Pomona Lake by Geomorphological Terrain Type.

	Lowland	Upland	Total	Percent
Plains Archaic	1/1	0/0	1/1	3.45/6.67
Plains Woodland	4/0	1/1	5/1	17.24/6.67
Plains Village	3/0	5/1	8/1	27.59/6.67
Historic Aboriginal	2/0	2/1	4/1	13.79/6.67
Historic Euroamerican	1/0	2/3	3/3	10.34/20.0
Unknown	4/2	4/6	8/8	27.59/53.32
Total	15/3	14/12	29/15	100.0/100.0
Percent	34.09/6.82	31.82/27.27	65.91/34.09	

Numbers to the left of the slash (/) in the table above represent components tabulated by Schmits (1988); those to the right represent those recorded in 1993. Note that these figures represent components and not individual sites. Forty sites have been reported from Pomona Lake, four are multicomponent.

Table 7. Setting, affiliation, site function, and recommendations for sites located in 1993.

Site Number	Topographic Position/Soil	Cultural Affiliation	Inferred Activity	Evaluations
14OS143	Upland	Unknown	Limited-Use	Site lacks content.
14OS144	Upland	Unknown	Camp	Limited content. Site disturbed by construction activity.
14OS145	Upland	Pomona/ Woodland	Village	Testing to determine NRHP content.
14OS146	Upland	Unknown	Camp	Remove from agricultural use.
14OS147	Lowland	Unknown	Camp	Site lacks content.
14OS148	Lowland	Unknown	Camp	Remove from agricultural use.
14OS149	Upland	Unknown	Limited-Use	Site lacks content. Heavily eroded by wave action.
14OS150	Upland	Unknown	Camp	Site lacks content. Heavily eroded by wave action.
14OS151	Lowland	Archaic	Camp	Remove from agricultural use.
14OS152	Upland	Unknown	Limited-Use	Site lacks content.
14OS153	Upland	Historic/ Euroamerican	Residential	Limited content. Foundation disturbed. No further work required.
14OS154	Upland	Historic/ Euroamerican	Residential	Testing to determine NRHP content.
14OS155	Upland	Historic/ Sac/Fox	Burial?	Unknown. Testing to determine content. Requires NAGPRA justification
14OS156	Upland	Historic/ Euroamerican	Residential	Limited content. Foundation walls.

Table 8. Acreage surveyed, number of sites located and predicted number of sites by terrain types per section for Pomona Lake.

	Acres Surveyed		Sites Located		Sites Per Acre		Predicted No. of Sites Per Section		Acres Surveyed		Sites Located		Sites Per Acre		Predicted No. of Sites Per Section		Total Acres		Sites Per Acre		Total Predicted	
	1982	1984	1982	1984	1982	1984	1982	1984	1982	1984	1982	1984	1982	1984	1982	1984	1982	1984	1982	1984	1982	1984
Lowlands	975		3		0.003077		1.97		498		3		0.00602		3.86		1473		0.0041		2.61	
Uplands	1005		7		0.00695		4.45		4023		11		0.00273		1.75		5028		2.2912		2.29	
Total	1980		10		0.00505		3.23		4521		14		0.00310		1.98		6501		2.3627		2.36	

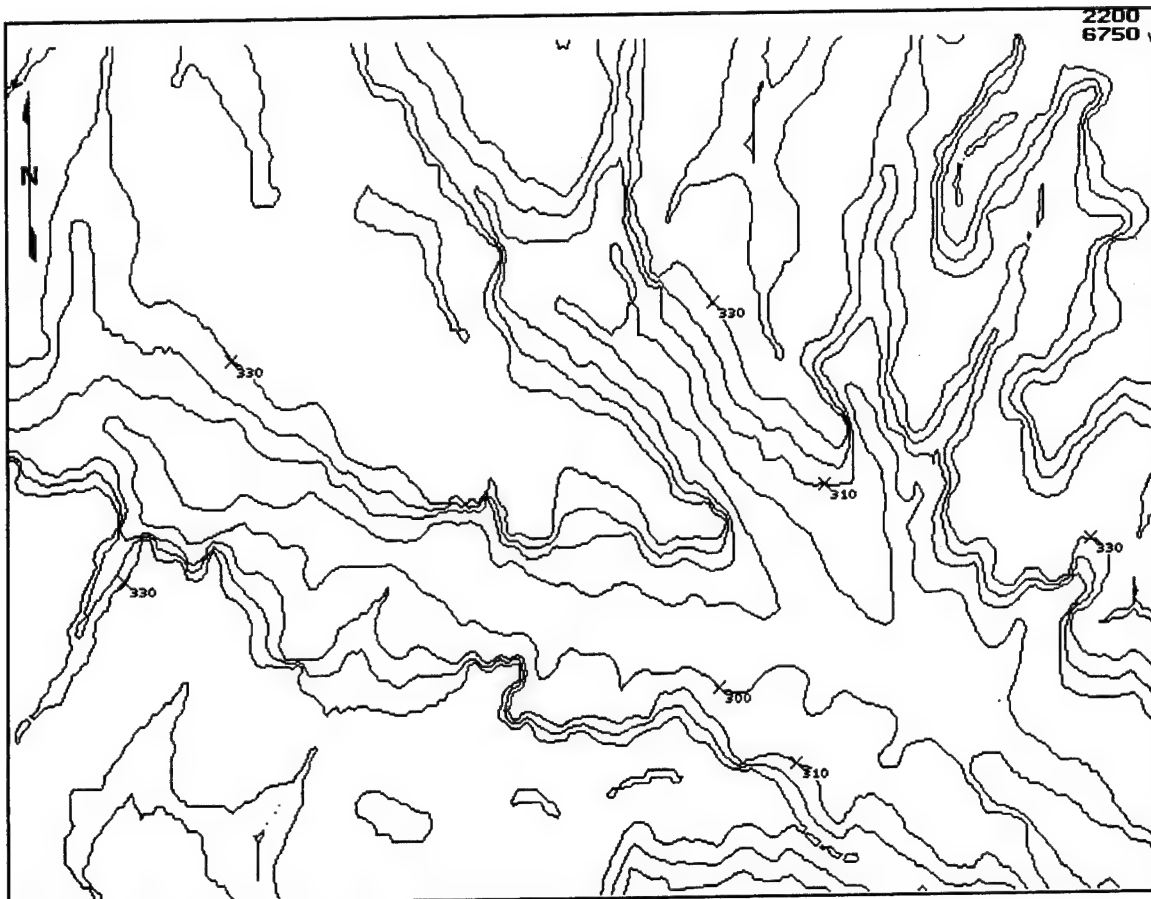


Figure 21. DEM produced topographic map of Pomona Lake

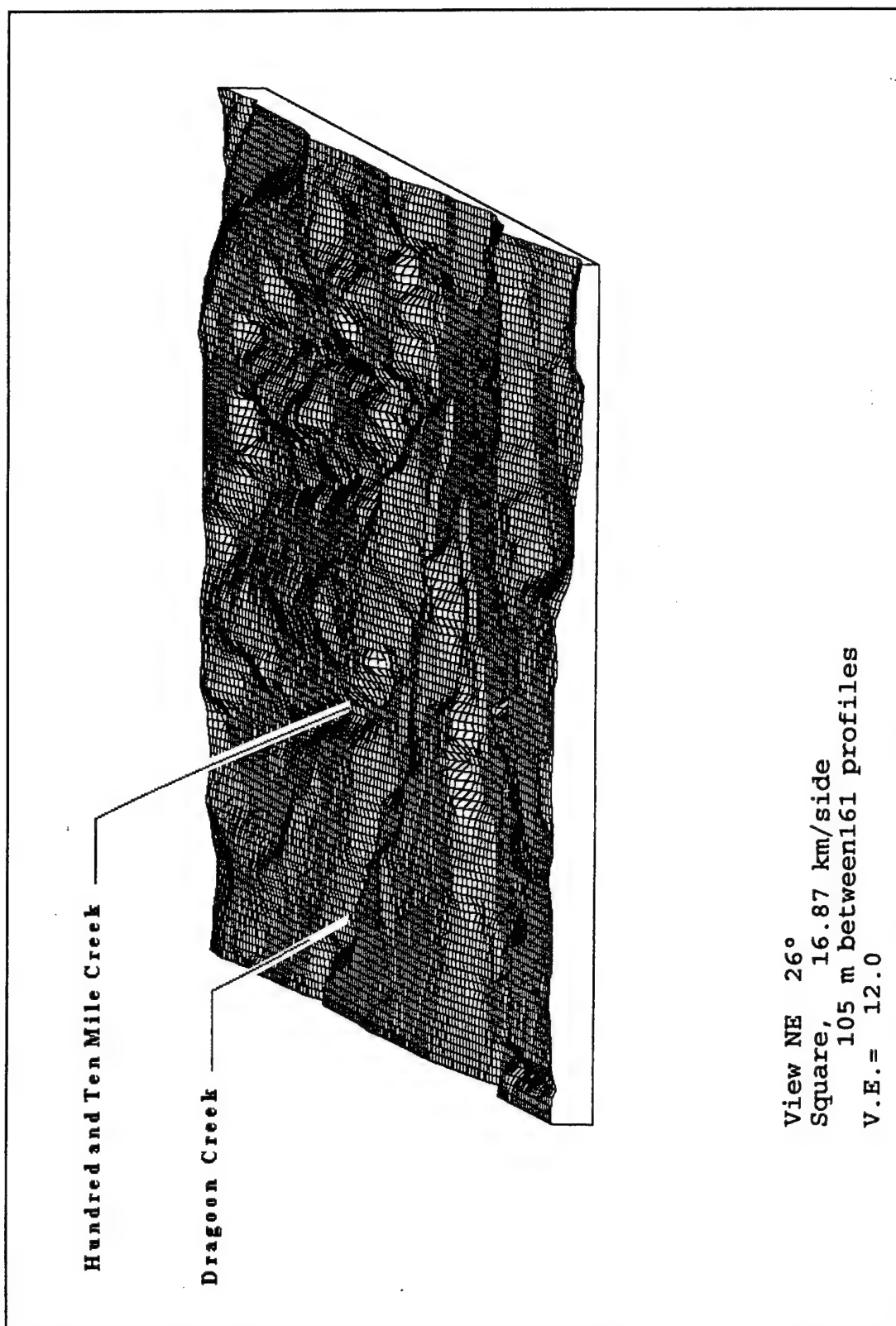


Figure 22. Terrain model of Pomona Lake.

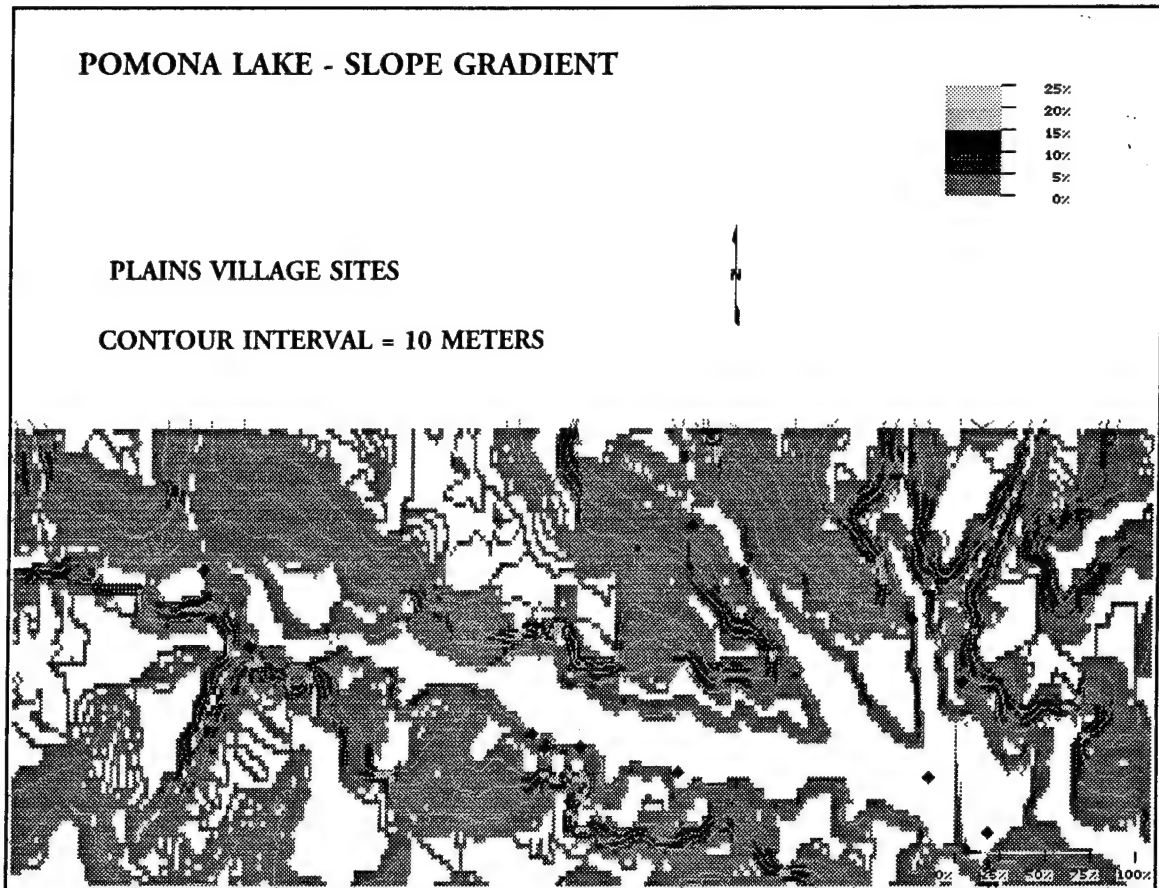


Figure 23. Slope gradient at Pomona Lake.

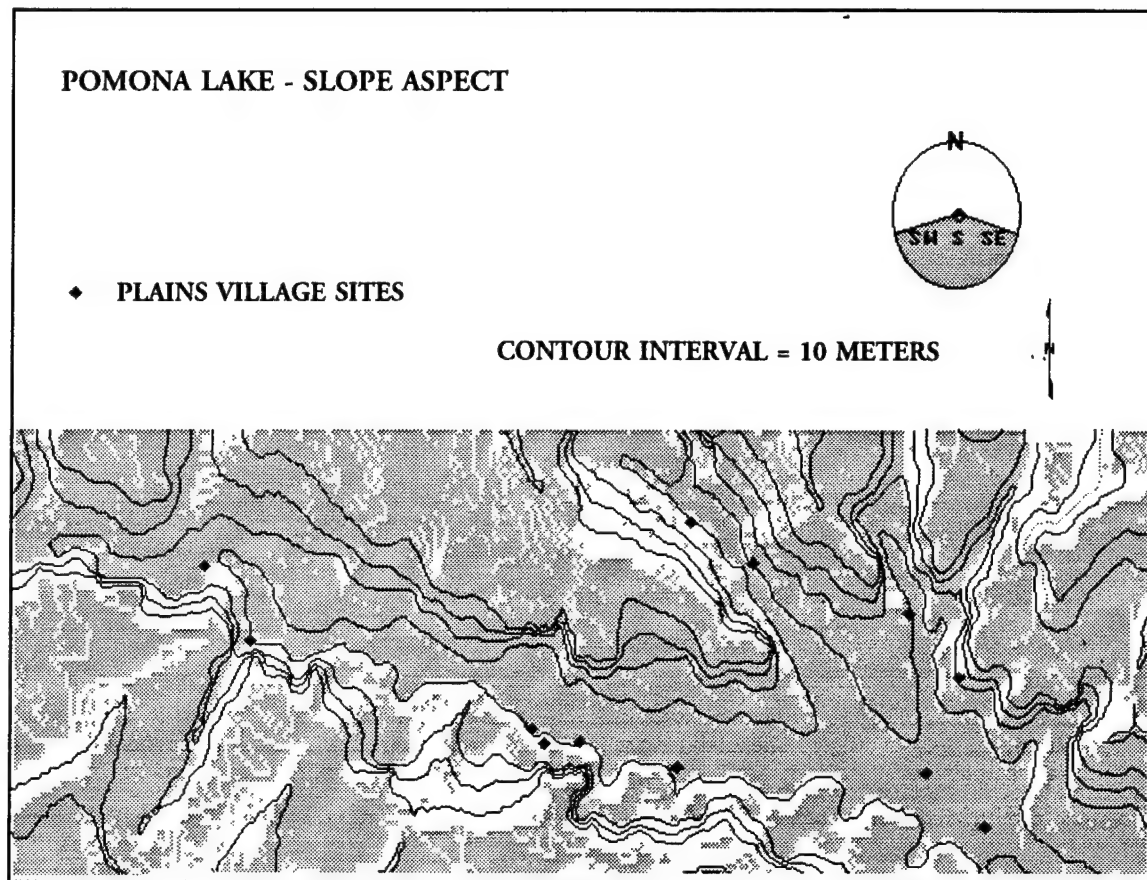


Figure 24. Slope aspect at Pomona Lake.



## LIST OF TERMS

**Alluvial soil-** A soil developed from alluvium and exhibiting essentially no horizon development or modification of the recently deposited materials.

**Archeological assessment-** An evaluation of the archeological resources present in an area, their scientific significance, and the cost of protecting or properly investigating them.

**Archeological resources-** Objects and areas made or modified by humans and the data associated with these artifacts and features.

**Archeology-** The study of the social and cultural past through material remains with the aim of ordering and describing the events of the past and explaining the meaning of those events.

**Archaic-** A New World chronological period characterized by a mobile lifeway and regional exploitation patterns, often on a seasonal basis.

**Artifact-** A discrete and portable object whose characteristics result wholly or in part from human activity; artifacts are individually assignable to ceramic, lithic, metal, organic, or other categories.

**Assemblage-** A gross grouping of all subassemblages assumed to represent the sum of human activities carried out within an ancient community.

**B.P.-** Before the present.

**Biface-** Artifact bearing flake scars on both sides.

**Blade-** Specialized flake with parallel or sub-parallel lateral edges; the length being equal to, or more than, twice the width. Cross sections are plano-convex, triangulate, sub-triangulate, rectangular, trapezoidal. Some have more than two crests or ridges. Associated with prepared cone and blade technique; not a random flake.

**Blank-** A usable piece of lithic material of adequate size and form for making a lithic artifact--such as unmodified flakes of a size larger than the proposed artifact, bearing little or no waste material, and suitable for assorted lithic artifact styles. The shape or form of the final product is not disclosed in the blank. A series of objects in the early stages in the manufacturing process before the preform is reached.

**Body Sherd-** Fragment from the lower portion of a ceramic vessel.

**Burial Mound-** Mounds, often of rock or rock and earth, locally built primarily during the Woodland period which contain human burials.

**Camp site-** An archeological deposit, usually small and thin, which is the result of a brief settlement by a group of people.

**Chert-** A fine-grained siliceous rock. Impure variety of chalcedony resembling flint. Generally light colored.

**Chipped-stone artifacts-** A class of lithic artifacts produced by fracturing to drive flakes from a core.

**Chronology-** The study of a culture or site in terms of its age. The orderly sequence of a series of sites or cultures according to their occurrence in time.

**Clay-** A soil separate consisting of particles 0.002 mm in equivalent diameter. Soil material containing more than 40 percent clay, less than 45 percent sand and less than 40 percent silt.

**Coiling-** A method of manufacturing pottery. Long fingerlike rolls of clay are added one on top of another in a circular fashion, starting at the bottom of a pot and continuing up the sides. The interior and exterior surfaces are then smoothed.

**Colluvium-** A deposit of rock fragments and soil material accumulated at the base of steep slopes as a result of gravitational action.

**Complex-** An arbitrary chronological unit defined for data categories, such as artifact industries, and used in the culture historical approach.

**Component-** The manifestation of any given focus (phase) at a specific site. The social equivalent of component is the community.

**Contour-** An imaginary line connecting points of equal elevation on the surface of the soil.

**Core-** A lithic artifact from which flakes are removed; it is used as a tool or a blank from which other tools are made.

**Cortex-** Natural surface, or rind, on flint-like materials.

**Cultural resource management (CRM)-** The conservation and selective investigation of prehistoric and historic remains; specifically, the development of ways and means, including legislation, to safeguard the past.

**Cultural resources-** The remains that compose our nonrenewable heritage from the past, including both the archeological and the historical records.

**Curation-** The systematic maintenance and storage of the archeological data base in such a manner as to retain the integrity of those data and allow it to be accessible and usable for future researchers.

**Debitage-** the debris resulting from the manufacture of chipped-stone artifacts, that provides evidence for the reconstruction of ancient manufacturing behavior.

**Determination of eligibility-** The determination that a property is eligible for inclusion in the National Register of Historic Places. The determination process, outlined in 36 CFR 63, provides the mechanism whereby a government agency can determine whether its undertaking affects significant properties, as required by P.L. 93- 291, Section 3 (a) or (b), for those properties not already on the National Register.

**Diagnostic artifact-** Material remnant of a historic or prehistoric technology that provides a temporal and cultural association, which has been determined by previous scientific investigations.

**Environment-** The conditions that surround and affect the evolution of culture and

human society, subdivided into biological, cultural, and physical environments.

**Erosion-** The wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as gravitational creep.

**Flake tools-** Stone tools made from flakes removed from cores.

**Flake-** A lithic artifact detached from a core, either as debitage or as a tool.

**Floodplain-** The land bordering a stream, built up of sediments from overflow of the stream and subject to inundation when the stream is at flood stage.

**Flute-** A negative semi-concave flake scar having parallel sides. The result of force applied to the objective piece which has previously had special preparation of the surface and platform area to accomplish fluting. A concave trough on the artifact from the proximal toward the distal end. Generally related to bladmaking and basal thinning of projectile points. Produced to allow special hafting. The act of removing a channel flake the vertical length of the artifact. Syn.: Channel flake scar.

**Geomorphology-** The part of geography concerned with the form and development of the landscape.

**Graver-** A stone implement generally made by pressure flaking and intentionally designed to have a functional point or points. It is generally assumed that gravers are used to incise or form organic materials and soft stone.

**Grit tempering-** Crushed particles of rock such as limestone, chert, or granite which are added intentionally to pottery clay. The grit tempering is supposed to keep the pottery vessel from breaking when it is fired.

**Haft element-** The portion of a tool exhibiting some facility, (e.g., notching, constriction, and/or grinding), differentiating it from the working portion of a tool and allowing it to be fastened to a handle or shaft.

**Horizon-** The cross-cultural regularities at one point in time; the spatial baseline of the New World culture historical approach synthesis proposed by Willey and Phillips (1958).

**Incising-** The act of cutting a design into a pottery surface.

**Indurated clay-** Temper inclusions in ceramic paste made from ground shale.

**Integrity-** A site that is intact and undisturbed enough to permit the preservation of significant scientific data possesses integrity.

**Intensive survey-** Systematic, detailed, on-the-ground field inspection conducted by professional archeologists which is sufficient to permit determination of the number and extent of the resources present and their scientific importance.

**Isolated find-** The occurrence, usually on the surface, of a single artifact. Not considered a true site.

**Knapper-** A producer of chipped-stone artifacts.

**Lanceolate-** Lance or spearlike.

**Lithic scatter-** A site characterized by a number of flakes and/or tools.

**Lithic-** Derived from the Greek word lithos-"stone." Pertaining to stone.

**Loess-** Material transported and deposited by wind and consisting of predominantly silt-sized particles.

**Mitigation-** The amelioration of losses of significant scientific, prehistorical, or archeological data accomplished through pre-planned actions to preserve or recover such data by application of professional techniques and procedures.

**amsl-** above mean sea level.

**National Register** An official list maintained by the National Park Service of architectural, historical, archeological, and cultural sites of local, state, or national significance worthy of preservation. These sites are nominated to the Register by states or federal agencies and are approved by the National Register staff of the National Park Service.

**Perforator-** A chipped stone artifact used as an awl or punch.

**Phase-** The manifestation of a basic cultural unit that could be comparable to social units in ethnography, such as a tribe or interrelated bands or any unit that has relatively definite boundaries spatially and chronologically and is relatively uniform culturally.

**Plano-convex-** Flat on ventral surface--curved on dorsal surface. Common to unifacial artifacts.

**Pleistocene-** A geological period characterized by successive glacial advances and retreats, ending about 11,500 years ago.

**Point-** A bifacially flaked, bilaterally symmetrical chipped stone artifact exhibiting a point of juncture on one end and some facility for hafting on the opposite end.

**Sherd-** A piece of a broken pottery vessel.

**Pottery-** A class of ceramic artifacts in which clay is formed into containers (by hand, in molds, or using a potter's wheel), often decorated, and fired.

**Preform-** Preforming denotes the first shaping. Preform is an unfinished, unused form of the proposed artifact. It is larger than, and without the refinement of, the completed tool. It is thick, with deep bulbar scars, has irregular edges, and no means of hafting. Generally made by direct percussion. Not to be confused with a "blank."

**Primary flake-** One of the initial flakes detached from the outside of a core. A portion of the core's weathered exterior (cortex) is retained on the flake.

**Principal investigator-** A professional archeologist and the person directly responsible for the location and identification or data recovery project. He is responsible for the validity of the material presented in cultural, historical, and archeological reports. The principal investigator signs the final report and in the event of controversy or court challenge

testifies on behalf of the client in support of report findings.

**Projectile point-** Spear point, dart point or arrowpoint. An arrowhead may be unpointed or transverse.

**Protohistory-** A transition period between the prehistoric and the historical eras.

**Provenience (provenance)-** The three-dimensional location of archeological data within or on the matrix at the time of discovery.

**Radiocarbon age determination-** A radiometric age determination technique based on measuring the decay of the radioactive isotope of carbon to stable nitrogen.

**Research design-** A systematic plan to coordinate archeological research to ensure the efficient use of resources and to guide the research according to the scientific method.

**Retouch-** A technique of chipped-stone artifact manufacture in which pressure flaking is used to detach small steep flakes to modify the edges of flake tools.

**Rim sherd-** A fragment of the upper circular edge of a ceramic vessel.

**Scope of work-** A document prepared by a sponsoring agency, the State Historic Preservation Officer or the National Park Service, setting forth its requirements in a cultural resources study.

**Scraper-** A stone implement used to remove fat from hides, smooth wood, scrape leather, etc. Different types are described in terms of the shape and/or position of the cutting edge: side scraper, end scraper, scraper, etc.

**Serrating-** Indenting the edges by alternating the removal of flakes; or the repeating of notches at regular intervals.

**Settlement pattern-** The distribution of features and sites across the landscape.

**Shatter-** Irregular piece of lithic manufacturing debris.

**Shell tempering-** Small pieces of crushed shell added to the clay before making pottery common in the Mississippian or Plains Village time period.

**Sherd-** A broken piece of a pottery vessel. One of the most durable of archeological specimens.

**Site-** A spatial clustering of archeological data, comprising artifacts, ecofacts, and features in any combination.

**Soil map-** A map showing the distribution of soil types or other soil mapping units in relation to the prominent physical and cultural features of the earth's surface.

**Soil-** A dynamic natural body on the surface of the earth in which plants grow, composed of mineral and organic materials and living forms. The collection of natural bodies occupying parts of the earth's surface that support plants and that have properties due to the integrated effect of climate and living matter acting upon parent material, as conditioned by relief, over periods of time.

**Spokeshave-** A specialized type of scraper with a rounded notch in the edge and probably used for scraping wooden shafts.

**Stratigraphy-** The archeological evaluation of the significance of stratification to determine the temporal sequence of data within stratified deposits by using both the law of superposition and context evaluations; also a specific relative age determination technique.

**Stratum-** Single sedimentary layer (plural, strata).

**Temper-** A nonplastic substance (such as sand) added to clay prior to pottery manufacture to reduce shrinkage and breakage during drying and firing.

**Terrace-** A level, usually narrow, soil surface bordering a river or lake.

**Testing-** A scientific technique of investigating archeological sites consisting of physical excavation of portions of a cultural or natural deposit and permanent recording of the results.

**Topsoil-** The upper part of the soil that is rich in organic matter.

**Tradition-** Cultural continuity through time; the temporal basis of the New World culture historical approach synthesis proposed by Willey and Phillips (1958).

**Trait-** A single element or item that is considered to be part of a particular culture. It may be an artifact, house structure, pit, or any smallest unit of a cultural manifestation.

**Typology-** Science of classifying stone tools by form, techniques and technological traits. Must include duplication of the technique by first observing the intentional form, then reconstructing or replicating the tool in the exact order of the aboriginal workman. Shows elements of culture. Typology cannot be based on function.

**Unifacial-** Objective piece bearing flake or blade scars on one surface only.

**Utilized flake-** A flake showing evidence of use or wear on one or more edges. No flakes have been intentionally removed, but very small flakes have incidentally detached during use.

## REFERENCES CITED

- Adair, Mary J.  
1988 Prehistoric Agriculture in the Central Plains. University of Kansas Publications in Anthropology No. 16.
- Ahler, Stanley A.  
1971 Projectile point form and function at Rodgers Shelter, Missouri. Missouri Archaeological Society Research Series No. 8, Columbia.  
  
1973 Post-Pleistocene depositional change at Rodgers Shelter, Missouri. Plains Anthropologist 18:1-26.  
  
1976 Sedimentary processes at Rodgers Shelter, Missouri. In Prehistoric man and his environments: A case study in the Ozark Highland, edited by W. Raymond Wood and R. B. McMillan, pp. 123-139. Academic Press, NY.
- Albertson, F. W.  
1937 Ecology of mixed prairie in west central Kansas. Ecology Monographs 7:481:547.
- Aldenderfer, Mark S. and K. D. Bezsylo  
1980 Prediction under constraint: The Wayne County project. Contract Abstracts and CRM Archaeology 1(3):21-24.
- Anderson, Duane C.  
1980 The stone tool assemblage at the Cherokee site. In The Cherokee Excavations, edited by Duane C. Anderson and Holmes A. Senken, Jr., pp. 197-238. Academic Press, New York.
- Andreas, A. T.  
1883 History of the State of Kansas. A. T. Andreas, Chicago.
- Antevs, Ernst  
1955 Geologic-climatic dating in the west. American Antiquity 20(4):317-35.
- Artz, Joe Alan  
1984 The soils and geomorphology of the East Branch Walnut Valley: contexts of human adaptation in the Kansas Flint Hills. Unpublished M.A thesis, Department of Anthropology, University of Kansas, Lawrence, Kansas.
- Barker, William T.  
1969 The flora of the Kansas Flint Hills. The University of Kansas Science Bulletin 48(14):525-584.

- Beck, H. V.  
 1959 Geology and ground-water resources of the Kansas River Valley between Wamego and Topeka vicinity. Kansas Geological Survey Bulletin 135.
- Bindwell, O. W.  
 1960 Soil survey of Geary county, Kansas. U. S. Department of Agriculture, Soil Conservation Service, Washington, D. C.
- Borchert, J. R.  
 1950 The climate of the Central North American grassland. Annals of the Association of American Geographers 60(1):1-39.
- Blackmar, F. W. (editor)  
 1912 Kansas: a cyclopedia of state history, embracing events, institutions, counties, cities, towns, prominent persons, etc. Two vols. Standard Publishing Co., Chicago.
- Bradley, Larry E.  
 1968 Archaeological investigations in the Melvern Reservoir, Osage County, Kansas 1967. Report submitted to the National Park Service, Midwest Research Center, Lincoln.
- Brakenridge, G. R.  
 1978 Quaternary deposits and soils in southern Missouri and their paleoclimatic significance. In Tenth International Congress on Sedimentology Abstracts, Vol.1, pp. 82-83. International Association of Sedimentologists.  
 1979 The impact of climatic change on flood plain sedimentation, soil formation, and eolian activity in southern Missouri. Geologic Society of America Abstracts with Programs.  
 1981 Late Quaternary floodplain sedimentation along the Pomme de Terre River, southern Missouri. Quaternary Research 15(1):62-76.
- Brogan, William T.  
 1981 The Cuesta phase: a settlement pattern study. Kansas State Historical Society Anthropological Series No. 9.  
 1982 The Roth site: an early Pomona manifestation in eastern Kansas. Kansas State Historical Society Contract Archaeology Publication No. 1.



- Brown, K.  
1984 Pomona: a Plains Village Variant in Eastern Kansas and Western Missouri. Unpublished PhD dissertation, University of Kansas Department of Anthropology, Lawrence.
- Brown, Kenneth L. and Alan H. Simmons (Eds.)  
1987 Kansas Prehistoric Archaeological Preservation Plan. Kansas State Historical Society, Topeka.
- Butler, W. B. and J. J. Hoffman  
1992 A Checklist of Plains Ceramics Types and Wares. South Dakota Archaeology 16:1-106.
- Calabrese, F. A.  
1967 The archaeology of the Upper Verdegris watershed. Kansas State Historical Society Anthropological Series No. 3. Topeka.
- Caldwell, Willian W. and Dale R. Henning  
1987 North American Plains. In Chronologies in New World Archaeology, edited by R. E. Taylor. Academic Press, New York.
- Champe, John L.  
1946 Ash Hollow Cave. University of Nebraska Studies, New Series, No. 1.
- Chapman, Carl H.  
1975 The Archaeology of Missouri, I. University of Missouri Press, Columbia, Missouri.  
  
1980 The Archaeology of Missouri, II. University of Missouri Press, Columbia.
- Chapman, Richard  
1977 Analysis of the lithic assemblages. In Settlement and subsistence along the lower Chaco River: The CGP Survey, edited by C. A. Reher. University of New Mexico Press, Albuquerque.
- Charthoff, Joseph L and Kerry K. Charthoff  
1980 The discovery of archaeological site: a review of methods and techniques. Report submitted to the U. S. Forest Service. California.
- Copple, O. A.  
1970 History of Osage City and Osage County. Osage City.

Corps of Engineers

- 1981 Operational Management Plan, Design Memorandum No. 15A, (November). Kansas City District.
- 1983 Master Plan, Design Memorandum No. 15A, (February). Kansas City District.
- 1987 Project Constuction and Operation, Historic Preservation Program, Regulation No. 1130-2-438. Washington, D.C.
- 1988 Project Maps. Kansas City District.
- 1993 Pomona Lake Informer. Vol. 4, No. 1, Summer. Kansas City District.

Davis Stanly W. and W. A. Carson

- 1952 Geology and ground-water resources of the Kansas River valley between Lawrence and Topeka, Kansas. Kansas Geological Survey Bulletin 96(5):201-276.

Dickey, H.

- 1990 Soil Survey of Osage County, Kansas. U. S. Department of Agriculture Soil Conservation Service. Washington, D. C.

Dixon, K. A.

- 1977 Applications of archaeological resources: Broadening the basis of significance. In Conservation Archaeology, edited by Michael B. Schiffer and G. J. Gumerman, pp. 277-92. Academic Press, New York.

Eyman, C. E.

- 1966 The Schultz focus: a Plains Middle Woodland burial complex in eastern Kansas. Unpublished M.A. thesis, Department of Archaeology, University of Alberta at Calgary.

Fader, Stuart W.

- 1974 Ground-water in the Kansas River Valley Junction City to Kansas City, Kansas, Kansas Geological Bulletin 206(2):1-12.

Fishel, Vinton C.

- 1948 Ground-water resources of the Kansas City, Kansas area, Kansas Geological Survey Bulletin 71, 109 p.

Frison, George C.

- 1978 Prehistoric hunters of the High Plains. Academic Press, New York.

- Frye, J. C. and A. B. Leonard  
 1952 Pleistocene geology of Kansas. Kansas Geological Survey Bulletin 99.
- Geary County Soil Survey  
 1960 Soil survey Geary County, Kansas. Series 1955, No. 6. U.S. Government Printing Office, Washington D. C.
- Glassow, Michael  
 1977 Issues in evaluating the significance of archaeological resources. American Antiquity, 42(3):413-20.
- Goodyear, Albert C.  
 1975 A research design for the study of Dalton settlement-subsistence activities in the Cache River basin. In The Cache River archaeological project, edited by Michael B. Schiffer and John H. House, pp. 205, 216. Arkansas Archaeological Survey Research Series No. 8.
- Grange, Rodger T., Jr.  
 1979 An archaeological view of Pawnee origins. Nebraska History 60(2):134-160. Lincoln.
- Grosser, Roger  
 1973 A tentative cultural sequence for the Snyder site, Kansas. Plains Anthropologist 18(61):228-238.
- Hall, E. R.  
 1955 Handbook of the Mammals of Kansas. University of Kansas, Museum of Natural History, Lawrence.
- Hall, Stephen A.  
 1977 Geological and paleoenvironmental studies. In the prehistory and paleoenvironment of Birch Creek Valley, edited by Donald O. Henry, pp. 11-31. Laboratory of Archaeology, University of Tulsa.
- Henry, Donald O.  
 1979 The prehistory and paleoenvironment of Hominy Creek valley: 1977 field season. University of Tulsa, Contributions in Archaeology 4.
- Isaac, Glynn L1.  
 1977 Olorgesailie. The University Press of Chicago, Chicago.
- Jantz, Donald R. and Orville W. Jaffry  
 1980 Soil survey of Dickinson County, Kansas. U.S. Department of Agriculture, Soil Conservation Service.

- Jantz, Donald R., Rodney F. Harner, Harold T. Rowland and Donald A. Gier  
 1975 Soil Survey of Riley and part of Geary County, Kansas. U.S. Department of Agriculture, Soil Conservation Service.
- Johnson, Alfred E.  
 1968 Archaeological Investigations in the Clinton Reservoir Area Eastern Kansas. University of Kansas Museum of Anthropology. Report submitted to the U.S. Department of the Interior, National Park Service, Midwest Archaeological Center.  
 1976 A model of the Kansas City Hopewell subsistence-settlement system. In Hopewellian archaeology in the lower Missouri Valley, edited by Alfred E. Johnson. University of Kansas Publications in Anthropology 8:7-15.  
 In Plains Woodland. To appear in a forthcoming Handbook of North Press American Indians.  
 1992 Early Woodland in the Trans-Missouri West. Plains Anthropologist 37:129-136.
- Johnson, Alfred E. and Wood, W. Raymond  
 1980 Prehistoric studies on the Plains. In Anthropology on the Great Plains, edited by W. Raymond Wood and Margot Liberty. University of Nebraska, Lincoln.
- Johnson, Donald L.  
 1977 Soils and soil-geomorphic investigation in the lower Pomme de Terre Valley. In Cultural Resources Survey, Harry S. Truman Dam and Reservoir Project, Vol. 10, pp. 59-139. Department of Anthropology, University of Missouri, Columbia.
- Johnson, Eileen and Vance T. Holliday  
 1981 Late Paleo-Indian activity at the Lubbock Lake site. Plains Anthropologist 26(93):173-193.
- Jordan, Terry G., Mona Domosh, and Lester Rowntree  
 1994 The Human Mosaic. Harper Collins, New York.
- Kansas Preservation Department  
 1987 Kansas Preservation Plan: Study unit on the Period of Exploration and Settlement (1820's-1880's). Kansas State Historical Society, Topeka.

- Katz, P.R.  
1971 Archaeology of the Sutter site in northeastern Kansas. Plains Anthropologist, 16(51):1-19.
- King, Thomas F.  
1975 Cultural resource law and the contract archaeologist: methods of evaluation and reporting. New York Archaeological Council, Buffalo.
- Kivett, Marvin F.  
1962 Logan Creek complex. Paper presented at the 20th Plains Conference, Lincoln.
- Klepinger, Linda and Dale Henning  
1976 The Hatten Mound: A two-component burial site in northeast Missouri. The Missouri Archaeologist 37:92-166.
- Kopsick, Paul R.  
1982 Geology of the Little Blue Valley. In Little Blue Prehistory: Archaeological Investigations at Blue Springs and Longview Lakes, Jackson County, Missouri. Report submitted to the Department of the Army, Corps of Engineers, Kansas City District.
- Kreiger, Alex D.  
1964 New World lithic typology project: Part 2. American Antiquity 29:484-493.
- Kuchler, A.W.  
1964 Potential natural vegetation of the coterminous United States. American Geographical Society, Special Publication 36:1-38. New York.  
  
1967 Some geographic features of the Kansas prairies. Transactions of the Kansas Academy of Science 70(3):388-401.  
  
1974 A New Vegetation Map of Kansas. Ecology 55:586-604.
- Kuyendall, Sally  
1979 A trail to Kansas. Ms. on file, U.S. Army Corps of Engineers, Kansas City District.
- Kvamme, Kenneth L.  
1986 An Overview of Geographic Information Systems for Archaeological Research and Data Management. National Workshop On Microcomputers In Archaeology, sponsored by the SAA Workshop.

- Lees, William B., Rolfe D. Mandel and Katie A. Parker  
 1982 National register testing at 23BE1007, 23BE1008 and 23BE1010 downstream from the Harry S. Truman Dam and Reservoir, Benton County, Missouri. Report submitted to the U.S. Army Corps of Engineers, Kansas City District.
- Lees, William B.  
 1989 Kansas Preservation Plan: Section on Historical Archaeology. Kansas State Historical Society, Topeka.
- Lipe, William D.  
 1974 A conservation model for American archaeology. The Kiva 39:213-245.
- Lippincott, Kerry  
 1978 Solomon River Upper Republican settlement ecology. In The Central Plains Tradition: internal development and external relationships, edited by Daniel J. Blakeslee, pp. 81-93, Office of the State Archaeologist Report No. 1, Iowa City.
- Logan, Brad  
 1981 Wiley site ceramics: a description and spatial analysis. Kansas Anthropological Association Journal (2):84-102.
- Lohman, Stanley W.  
 1941 Ground-water conditions in the vicinity of Lawrence, Kansas, Kansas Geological Survey Bulletin 36(2):17-64.
- McGimsey, Charles R. III  
 1979 The once and future data. American Antiquity 44(3):583-589. Washington, D.C.
- Margry, Pierre  
 1886 Explorations of the tributaries of the Mississippi and discovery of the Rocky Mountains, 1679-1754. Part VI of discoveries and establishments of the french within the west and within the south of North America, 1614-1754. Paris, Imprimerie, Jouaust et Sejoux Reu Saint-Honore, 338, 1856. Translated by Beatrice Paddock, 1936.
- Marshall, James O.  
 1972 The archaeology of the Elk City Reservoir: a local sequence in southeastern Kansas. Kansas State Historical Society Anthropological Series No. 6. Topeka.

- Marshall, James O. and Thomas A. Witty, Jr.  
 1967 The Bogan site 14GE1, an historic Pawnee village. Kansas State Historical Society, Topeka.
- Meyers, Thomas P. and Ray Lambert  
 1983 Meserve points: Evidence of a Plains-ward extension of the Dalton horizon. Plains Anthropologist 28:109-114.
- Miller, Nyle  
 1974 July 12 Letter to Chief of Engineering Division, Paul Barber, regarding sites 140S301-306, 140S308-311, and 140S342.
- Moore, P.S. and W.J. Birkby  
 1964 Archaeological investigations in Melvern Reservoir, Osage County, Kansas, 1962. Report submitted to the National Park Service, Lincoln.
- Morse, Dan F. and Phillip A. Morse  
 1983 Archaeology of the central Mississippi valley. Academic Press, New York.
- Muller, J.D. and J.M. Schock  
 1964 Appraisal of the archaeological resources of the Milford reservoir: Geary, Clay, Riley and Dickinson Counties, Kansas. Ms on file, Museum of Anthropology, University of Kansas, Lawrence.
- Native American Graves and Repatriation Act  
 1990 Public Law 101-601, 101st Congress, 25 USC 3001, November 16.
- Nichols, P.W., Voellinger, L.R. and M.D. Freeman  
 1980 Preliminary cultural resources management plan and 18% field survey of three public use areas Stockton Lake, Sac River, Missouri. Report submitted to U.S. Army Corps of Engineers. Kansas City, Missouri. Espey, Huston and Associates, Inc. Austin, Texas.
- O'Brien, Patricia J.  
 1976 Milford Lake shoreline archaeological survey. Report submitted to the National Park Service, Midwest Archaeological Center, Lincoln.
- 1978 A preliminary cultural resources plan for Milford Lake. Report submitted to the Department of the Army, Corps of Engineers, Kansas City District.
- 1984 Archaeology in Kansas. University of Kansas Museum of Natural History Public Educational Series No. 9.

- O'Brien, Patricia J., Clark Larsen, John O'Grady, Brian O'Neill, and A.S. Stirland  
1973 The Elliot site (14GE303): a preliminary report. Plains Anthropologist 18(59):54-71.
- O'Conner, Howard G.  
1955 Ground-water resources of Osage County, Kansas, Kansas Geological Survey Report, 13(3):28-50.
- Parks, Sharon G.  
1978 Test excavations at 14GE41: A Schultz focus habitation site. Report submitted to U.S. Army Corps of Engineers, Kansas City District.
- Phenice, Terrel W.  
1969 An analysis of the human skeletal material from burial mounds in north central Kansas. University of Kansas Publications in Anthropology No. 1. Lawrence.
- Raab, L. Mark and Timothy S. Klinger  
1977 A critical appraisal of "significance": in contract archaeology. American Antiquity 42(4):629-634.  
1979 A reply to Sharrock and Grayson on archaeological significance. American Antiquity 44(2):328-329.
- Reeder, Robert L.  
1980 The Sohn site: a lowland Nebo Hill complex campsite. In Archaic prehistory on the prairie-plains border, edited by Alfred E. Johnson, pp. 55-66. University of Kansas Publications in Anthropology No. 12.
- Reid, Kenneth C.  
1980 Nebo Hill, Archaic political economy in the riverine midwest. Unpublished Ph.D dissertation, Department of Anthropology, University of Kansas, Lawrence.
- Reynolds, John D.  
1977 Preliminary report of archaeological investigations at site 14ML307, the Range Mound, Glen Elder, Kansas. Kansas Anthropological Association Newsletter 23(2,3).  
1979 The Grasshopper Falls phase of the Plains Woodland. Kansas State Historical Society Anthropological Papers, 7. Topeka.



- 1982 Archaeological investigations at the Cow-Killer site, 14OS347, Melvern Lake, Kansas, 1974-1975. Report submitted to the U.S. Army Corps of Engineers, Kansas City District.
- Robb, A. D.  
1941 "Climate of Kansas," In "Climate and Man," Yearbook of Agriculture, pp. 873-883. U.S. Department of Agriculture, Washington, D.C.
- Roberts, Richy L.  
1978 The archaeology of the Kansas Monument site: a study in historical archaeology on the Great Plains. M.A. thesis, Department of Anthropology, University of Kansas.
- Rodgers, Richard and Larry Martin  
1979 Radiocarbon dates on the Twelve Mile Creek site, a Paleo-Indian kill site in western Kansas. Abstract, Thirty-Seventh Plains Anthropologist Conference, Kansas City, Missouri. National Park Service, Lincoln.
- Roper, Donna C.  
1981 Prehistoric cultural continuity in the Missouri Ozarks: the Truman Reservoir mitigation project, edited by Donna C. Roper, draft submitted to the U.S. Army Corps of Engineers, Kansas City District. 4 volumes.
- Rydberg, P.A.  
1932 Flora of the prairies and plains of central North America. New York Botanical Garden, New York.
- Schiffer, Michael B. and G.L. Gumerman  
1977 Conservation Archaeology: a guide for cultural resource management studies. Academic Press, New York.
- Schiffer, M.B. and J.H. House  
1977a Cultural resource management and archaeological research: The Cache project. Current Anthropology 18(1):43-68.  
  
1977b An approach to assessing scientific significance. In Conservation Archaeology edited by Michael B. Schiffer and G.J. Gumerman, pp.249-258. Academic Press, New York.
- Schmits, Larry J.  
1978 The Coffey site: environmental and cultural adaptation at a prairie plains border Archaic site. Midcontinent Journal of Archaeology 3(1):69-185.

- 1980a Holocene fluvial history and depositional environments at the Coffey site, Kansas. In *Archaic Prehistory on the Prairie-Plains Border*, edited by Alfred E. Johnson. University of Kansas Publications in Anthropology 12, pp. . Lawrence.
- 1980b Williamson: a late Archaic site in east central Kansas. Contributing paper presented at the 36th Plains Conference, Denver.
- 1980c Report of excavations at the Salb site, 14CF331. In *Salvage Archaeology of the John Redmond Lake, Kansas*, edited by Thomas A. Witty, Jr. pp. 126-132. Kansas State Historical Society Anthropological Series No. 8. Topeka.
- 1980d The May Brook site. Report submitted to the City of Lee's Summit, Missouri.
- 1981 Archaeological and geological investigations at the Coffey site, Tuttle Creek Lake, Kansas. Report submitted to Interagency Archaeological Services Branch, Rocky Mountain Region. National Park Service, Denver.
- Schmits, Larry J. (Editor)
- 1983 Archaeological inventory and evaluation at the Milford and Melvern and Pomona Lake areas, eastern Kansas. Draft report submitted to the U.S. Army Corps of Engineers, Kansas City District.
- Schmits, Larry J., Kenneth C. Reid, and Nancy O'Malley
- 1980 Dead Hickory Tree: a Plains Village occupation in east-central Kansas. Missouri Archaeologist 41:1-56.
- Schmits, Larry J. (Ed.)
- 1988 Archaeological Inventory and Evaluation at Milford, Melvern, and Pomona Lakes, Eastern Kansas. Report submitted to the U.S. Army Corps of Engineers, Kansas City District.
- Schultz, Floyd and Albert Spaulding
- 1948 A Hopewellian burial site in the lower Republican valley, Kansas. American Antiquity 13(4):306-313
- Schwiekhard, Laura S. and Patricia J. O'Brien
- 1982 Sample archaeological survey of Milford Lake public use areas, Kansas. Report submitted to the U.S. Army Corps of Engineers, Kansas City District.

- Scoville, D.H., G.J. Gordon, and K.M. Anderson  
 1972 "Significance" in contract archaeology. American Antiquity 44(2):326-328.
- Self, H.  
 1978 Environment and Man in Kansas. The Regents Press of Kansas, Lawrence.
- Sharrock, F.W. and D.K. Grayson  
 1979 "Significance" in contract archaeology. American Antiquity 44(2):327-328.
- Smith, C.S. and W.H. Birkby  
 1962a A preliminary report on archaeological investigations in the Melvern Reservoir, Osage County, Kansas, 1962. Report submitted to the Interagency Archaeological Service, Denver.  
 1962b A preliminary report on archaeological investigations in the Melvern Reservoir, Osage County, Kansas, 1962. Kansas Anthropological Association Newsletter 8(4):33-36.
- Sperry, J.E.  
 1965 Cultural relationships of the Miller and Rush Creek archaeological sites on the lower Republican River of Kansas. Unpublished M.A. thesis, Department of Anthropology, University of Nebraska.
- Steinacher, Terry L.  
 1976 The Smoky Hill phase and its role in the central Plains Tradition. Unpublished M.A. thesis, Department of Anthropology, University of Nebraska.
- Thompson, D.M. and E.A. Bettis III  
 1980 Archaeology and Holocene landscape evolution in the Missouri drainage of Iowa. Journal of the Iowa Archaeological Society 27:1-60.
- Thornthwaite, C.W.  
 1948 An approach toward a rational classification on climate. Geographical Review 38:55-94.
- Traub, Susan  
 1975 Cultural resources survey of project lands, Melvern Lake, Osage County, Kansas. Report submitted to U.S. Army Corps of Engineers, Kansas City District.  
 1978 A preliminary cultural resource management plan, Pomona Lake, Osage County, Kansas. Report submitted to the U.S. Army Corps of Engineers, Kansas City District.

- Unrau, W.E.  
 1971 The Kansa Indians: A history of the wind peoples, 1673-1873. University of Oklahoma Press, Norman.
- Wedel, Waldo R.  
 1938 The direct-historical approach in Pawnee archaeology. Smithsonian Miscellaneous Collections, 97(7).  
 1943 Archaeological investigations in Platte and Clay counties, Missouri. United States National Museum, Bulletin 183.  
 1959 An introduction to Kansas archaeology. Smithsonian Institution, Bureau of American Ethnology, Bulletin 174, Washington, D.C.  
 1964 The Great Plains. In Prehistoric Man in the New World, edited by Jesse D. Jennings and Edward Norbeck, pp. 193-200. University of Chicago Press, Chicago.  
 1978 The prehistoric Plains. In Ancient Native Americans, edited by Jesse D. Jennings, pp. 183-220. Freeman, Cooper & Co., San Francisco.
- Wheat, Joe Ben  
 1972 The Olsen-Chubbuck site: a Paleo-Indian bison kill. American Antiquity Memoirs 37(1):1-180
- Williston, S.W.  
 1902 An arrowhead found with bones of Bison occidentalis Lucas, in western Kansas. American Geologist 30:313-315.  
 1905 On the occurrence of an arrowhead with bones of an extinct bison. Proceedings of the International Congress of Americanists, 13th Session, pp. 335-337.
- Wilmeth, Roscoe  
 1958 Appraisal of the archaeological resources of the Pomona and Melvern Reservoirs, Osage County, Kansas. Report submitted to the National Park Service.  
 1970 Excavations in the Pomona Reservoir. Kansas State Historical Society Anthropological Series No. 5. Topeka.
- Wilson, F.  
 1984 Landscapes: A geologic diary. In Kansas Geology, edited by R. Buchanan. University Press of Kansas, Lawrence.

Witthoft, John

- 1967 Glazed polish on flint tools. American Antiquity 32:383-388.

Witty, Thomas A., Jr.

- 1963 The Woods, Avery and Streeter archaeological sites in Milford Reservoir, Kansas. Kansas State Historical Society Anthropological Series No. 2. Topeka.
- 1967 The Pomona focus. Kansas Anthropological Association Newsletter 12(9):1-5.
- 1978 Along the southern edge: The Central Plains Tradition in Kansas. In the Central Plains Tradition: Internal Development and External Relationships, edited by Donald J. Blakeslee, Office of the State Archaeologist University of Iowa, Report 11:56-66.
- 1981a The Pomona focus, known and unknown. The Missouri Archaeologist 42.
- 1981b Phase III archaeological survey of project 31-K-1316-02, Geary County, Milford State Park Interior Roads. Report submitted to the Kansas State Department of Transportation.
- 1982 The Slough Creek, Two Dog and William Young site: Council Grove Lake, Kansas. Kansas State Historical Society Anthropological Series No. 10.

Wright, Carl M.

- 1982 An Archaic site in Osage County, Kansas. Journal of the Kansas Anthropological Association 3(1):7-9.

Ziegler, Robert J.

- 1992 Pomona Lake, Osage County, Kansas: Historic Properties Management Plan. Kansas City District, Corps of Engineers.

Zimolzak, Chester E. and Stansfield, Charles A., Jr.

- 1983 The Human Landscape: Geography and Culture. Second Edition. Charles E. Merrill Publishing Company, Columbus, Ohio.

Zornow, W.F.

- 1957 Kansas, A history of the Jayhawk State. University of Oklahoma Press, Norman.